

# Australian ELECTRONiCS ENGINEERING

Vol.31 No8

AUGUST 1998

Nicolet's "Odyssey" replaces chart and DAT recorders taking you "from sensor to report". Emona Instruments p.10



**Web Masters**

Internet Reference Guide

**Gateways**

Programmable Logic Feature

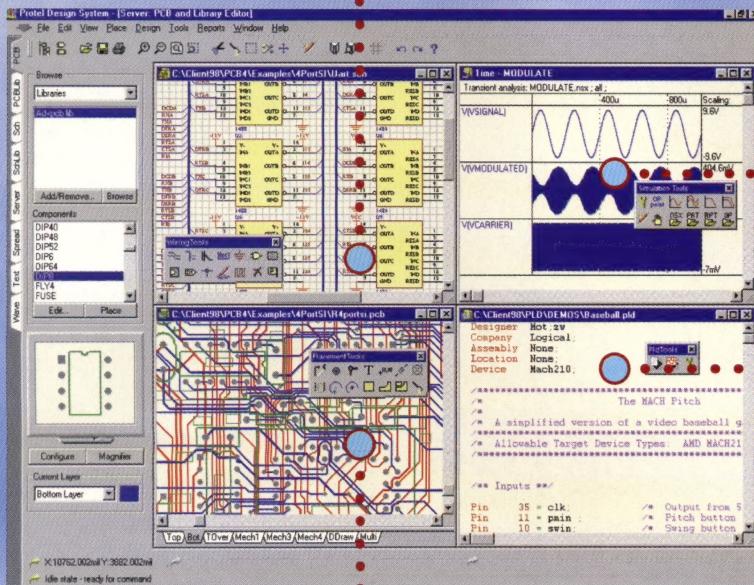
**SM Preview**

Surface Mount Conference

# It's time to put Windows NT to work

## Sit back, relax and let Protel 98 go to work for you

Who said a designer's life wasn't meant to be easy? *Protel 98* puts the most powerful, integrated, easiest to use electronic design tools for Windows NT at your fingertips, for a price any designer can afford. *Protel 98* is a complete 32-bit EDA design suite comprising all the tools you'll need to take your circuit design from concept through to final product - *Advanced Schematic 98*, *Advanced PCB 98*, *Advanced SIM 98*, *Advanced PLD 98* and *Advanced Route 98*, all integrated under Protel's unique EDA/Client environment.



### AdvancedSchematic98

The most powerful and easiest to use design entry tool for Windows NT. With comprehensive component libraries, advanced electrical rules checking and seamless integration with *Protel 98*'s simulation and PLD design tools, *Advanced Schematic 98* is the perfect front end for any electronic design project.

### AdvancedSIM98

True mixed-signal analog/digital simulation at the press of a button. *Advanced Sim 98* works hand-in-hand with *Advanced Schematic 98* to bring your designs to life, displaying both analog and digital waveforms side-by-side to give you a true picture of your circuit's performance.

### AdvancedPLD98

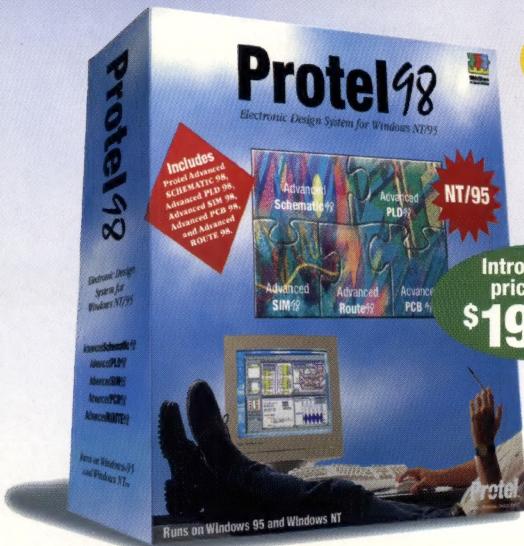
Universal device support and schematic integration make *Advanced PLD 98* an indispensable tool for incorporating programmable logic into your designs. Graphically capture your PLD circuit using *Advanced Schematic 98*, or enter the design using the industry-standard CUPL Hardware Description Language - *Advanced PLD* produces a standard JEDEC programming file ready for download to your target device.

### AdvancedPCB98

Enjoy the advantages of a fully rules-driven PCB design environment. *Advanced PCB 98* incorporates sophisticated connectivity analysis and on-line design rule checking to take the hard work out of board design. Advanced features such as predictive track placement, automatic obstacle avoidance and automatic via-insertion allow you to create sophisticated board designs quickly and easily.

### AdvancedRoute98

Intelligent shape-based autorouting that produces results comparable to those of an experienced board designer. *Advanced Route 98* incorporates sophisticated neural net technology that optimizes the routing strategy to suit the board at hand, giving unprecedented speed and completion rates. Fully integrated into *PCB 98*, *Advanced Route 98* works directly in the PCB window, automatically adhering to the relevant PCB design rules.



AdvancedRoute98  
& AdvancedPCB98 now integrated  
to work seamlessly as one.

Introductory  
price from  
**\$1995\***

**Protel**  
Making Electronic Design Easy™

**Sales Hotline: 1800 030 949 Fax: (02) 9984 0017**  
**Email: sales@protel.com.au**

Protel and the Protel logo are registered trademarks of Protel International Pty Ltd.

#### For more information:

- Please have a sales representative call me
- Please send me more information about *Protel 98*
- Please send me my **FREE 30-Day Trial CD**

**Fax: (02) 9984 0017**  
**Post: Protel International**  
**PO Box 1876, Dee Why**  
**2099 NSW Australia**

Name:		
Company:		
Title:		
Address:		
State:	Postcode:	
Email:		
Phone:	Fax:	



For product information visit  
**www protel com**

\*For users of *Protel V3* design suite

Enquiry No. 1301

**Protel 98  
Service Pack  
Now Available  
for Download!  
www protel com**



# From Concept to Reality

With over 47,000 employees in 276 locations in 53 countries, we have the resources to help you transform your "Concept to Reality". AMP competencies range from traditional terminals and connectors to leading-edge technologies in wireless, sensors sub-assemblies, cable assemblies and fiber optics. With AMP, you have the "Concept", we will help you make it into a "Reality".

Australian AMP PTY LTD  
13 Hudson Avenue, Castle Hill NSW 2154  
Tel: 98408200 Fax: 98895649

Melbourne Tel: 95456655 Fax: 95456800  
Western Australia Tel: 93093749 Fax: 93092865

[www.amp.com](http://www.amp.com)

AMP and Connecting at a Higher Level are trademarks.

Connecting  
at a  
**HIGHER**  
level.

**AMP**

Enquiry No. 1302

# It's that LED magic again...

GOOD PRODUCTS • GOOD SERVICE • GOOD PRICES

## TENROD

<http://www.tenrod.com.au>

NSW: TEL: (02) 9748 0655 FAX: (02) 9748 0258

VIC: TEL: (03) 9873 8788 FAX: (03) 9873 8799

QLD: St. Lucia Electronics  
TEL: (07) 3252 7466 FAX: (07) 3252 2862

E-mail: [sales@tenrod.com.au](mailto:sales@tenrod.com.au)



Enquiry



**Contents Copyright.** Published monthly by Reed Business Information.  
(ACN 000 146 921)  
**Locked Bag 2999.** Chatswood Delivery Centre,  
Chatswood NSW 2067  
Tower 2, 475 Victoria Avenue,  
Chatswood NSW 2067  
Tel: (61 2) 9422 2999 Fax: (61 2) 9422 2855

**Editor**

Jon Fairall

email: [jon.fairall@reedbusiness.com.au](mailto:jon.fairall@reedbusiness.com.au)

**Assistant Editor**

Christopher Connolly

**Asian News Source**

EDN Asia

**NSW Sales Manager**

Arthur Whall

**Vic Sales Manager**

Carol Ewing

**Qld Sales Manager**

Sharon Howard

**SA Sales Manager**

India Wallace

**WA Sales Manager**

Pamela Langdon-Walsh

**Publisher**

David Strong

**Production Manager**

Darrell Sly

**Graphic Designer**

Tom Lau

**Production Co-ordinator**

Stephanie de Bruce

**Circulation/Subscription enquiries**

call customer service on:

(02) 9934 7431 or (02) 9372 5189

or (02) 9372 5190

**Subs. Account Enquiries**

Jan Hood

**Victoria** Locked bag 20, Port Melbourne, 3207. Tel: (03) 9245 7373 Fax: (03) 9245 7511 **South Australia** Hestwell Williamson Ragatt, PO Box 21, Glen Osmond SA 5065. Tel: (08) 8379 9522 Fax: (08) 8379 9735 **Queensland** Jane Fewings Media & Advertising Associate, Level 1, 12 Riverview Terrace, Indooroopilly QLD 4068. Tel: (07) 3378 4522 Fax: (07) 3878 1071 **Western Australia** PLM Media, PO Box 2092, North Claremont, WA 6010. Tel: (08) 9284 7667 Fax: (08) 9284 7668 **New Zealand** Bridgman Marketing & Media, PO Box 6368, Auckland. Tel: 64 9 308 9693 Fax: 64 9 379 9148 **United Kingdom** Angel Business Communications Ltd, 34 Warwick Rd, Kenilworth, Warwickshire CV8 1HE Tel: 44 1926 512 424 Fax: 44 1926 512 948 **Germany** Friedrich Anacker, InterMedia Partners GmbH, Deutscher Ring 40, 5600 Wuppertal 11, Germany. Tel: 202 71 1091 Fax: 202 71 2431 **USA** Roy Dilton, Trade Media International Corporation, 1328 Broadway, New York, NY 10001 USA. Tel: (212) 564 3380 Fax: (212) 594 3841 **Hong Kong** Eastern Source International Media Centre, 25/F Great Smart Tower, 230 Wanchai Road, Hong Kong, Tel: 852 2890 5510 Fax: 852 2895 1443 **Singapore** Associate Media, 35 Tannery Road, #06-01 Tannery Block, Ruby Industrial Complex, Singapore 347740, Tel: 65 842 5136 Fax: 65 742 6933 **Taiwan** Peter Wilds, Worldwide Services Co Ltd, PO Box 44-100, Taichung, ROC Tel: 886 4 3251784 Fax: 886 4 3252967 **Canada** Mr Ed Bush, International Advertising Consultants Ltd, 2 Carlton Street, Suite 1301, Toronto, Ont. M5B 1J3. Tel: (416) 977 6269 Fax: (416) 977 6276 **Korea** Mr O-Kyu Park, World Marketing Inc, Dongbo Bldg, 81-9 Nomhyun-Dong, Gangnam-Ku, Seoul, 135-010 Korea. Tel: (822) 511 4944 Fax: (822) 548 8295 **Italy** OPO SRL Via Pirelli, 30, 20124 Milan. Tel: 39 2 671 431 Fax: 39 2 6707 6431 **Sweden** Utlandsannonser Finsbodor 29, S-131, 31 Nacka Tel: 468 442 71 73 Fax: 468 442 70 59 **Japan** Mr Haruki Hirayama, EMS Inc, 1-20-3-2F, Matsubara, Setagaya-ku, Tokyo 156, Japan. Tel: 81 3 3327 2888 Fax: 81 3 3327 3010

**Subscription Rates**

Australia (surface mail) \$82.00

Overseas Rates on application Printed by Superfine Printing Co Pty Ltd

All rights reserved. No part of the publication may be reproduced or copied in any form or by any means without the written permission of the publisher.

Unsolicited material is welcomed by the editor, but no responsibility is taken for return of copy or photographs, unless special arrangements are made.

ISSN 0004-9042

# Australian ELECTRONICS ENGINEERING

## NEWS 8

The Victorian government has announced its Chipskills Program, which will train Victorian students in design for the semiconductor industry. The announcement follows the decision by Korean based Anam to establish a semiconductor design centre in Melbourne.

## INTERNET REFERENCE GUIDE 16

AEE's first Internet guide will help you navigate around various Australian electronics industry sites.

## PRODUCT SURVEY 24

The latest new product releases in the field of electronic components.

## PROGRAMMABLE LOGIC FEATURE 31

### IMPLEMENTING FPGAs 32

*Ken O'Neill* and *Dave Wurthman* discuss the implementation of performance-intensive designs in FPGAs.

## THE FPGA REVOLUTION 37

*David Schroder* looks at the prospects for FPGA technology.

## FEATURES

### EMC — FACING THE CHALLENGE 40

*Ian Graham* and *Graham Callander* describe the challenge of EMC.

## NURTURING DEVELOPMENT 48

When NEC Australia launched its fully automated state-of-the-art surface mount line for electronic components in August of last year, the goal was to use the additional capacity to expand of the company's contract manufacturing business.

## SURFACE MOUNT '98 51

The Surface Mount conference celebrates its tenth anniversary this year. And to mark the occasion it has invited three speakers from the original conference, who are still active in the industry, to make new presentations.

## MICROPROCESSOR REFERENCE GUIDE 54

Our second microprocessor guide this year is even more comprehensive than before.

## OUT & ABOUT 64

Dr Kenneth Kim — Selling Chips to the Masses.

## DEPARTMENTS

From the editor's desk	7
Across the Tasman	50
Advertiser's Index	52
New Products	56
For Your Diary	66



Component distributor Veltek, part of Arrow Australia, recently celebrated ... its tenth birthday. See p.14

# Rojone Pty. Limited

Manufacturer & Distributors

## Celluar Products

Wide Band - **800-2000 MHz**  
**Low Intermodulation Design**

### Power Divider & Combiners (Low & Hi Power)

N Connectors, 1 in 2, 3, 4, 5, 6, & 8 Outputs

### Couplers

N Connectors - Values 3, 6, 8, 10, 15, 20 & 30 dB

### Attenuators

50 Watt - 3, 6 & 10 dB

100 Watt - 10, 20 & 30 dB - All N Type

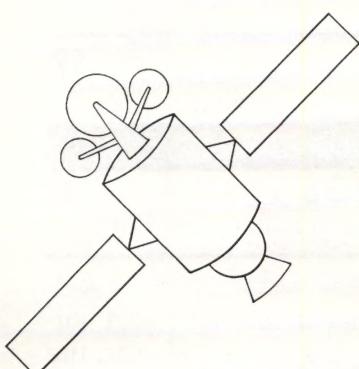
### Terminations

50 Ohm, 30, 50 and 100 Watt N Connectorized

### New Products

Hybrid Combiner 800-1000 MHz, Hi Power 200 Watt

Low Cost Power/VSWR Monitor for AMPS & GSM



## GPS Products Receiver & Antennas

Rojone manufactures a full range of GPS Products :- antennas active & passive, 2 Way splitter, DC Feed Circuits, GPS Repeater System for indoor signal reception & our state of the art GPS GENIUS Receiver.

### GPS GENIUS

12 Channel High Performance, Low Cost Receiver

SnapLoc Reacquisition - **100msec**

Cold Start **60 Seconds**, Hot Start **8 Seconds**

Minimum **3 Satellites to Start**, ONLY **ONE to Update**

Size 72mm Square, 15mm High - Magnetic Mount

Fully integrated antenna **"SMART ANTENNA"**

DC Input Voltage **+8VDC or +5VDC** order as required

**NMEA Output Data - RS232 or TTL**

DEMO Software supplied with each module



61 Aero Rd, INGLEBURN NSW 2565

Tel 02 9829 1555 <> Fax 02 9605 8812

email : sales@rojone.com.au

Web Site : www.rojone.com.au



# A PAULINE CONVERSATION

**D**emocracy depends on conflict. The operation of democratic society depends on different groups in society putting up arguments and testing them in public, in the hope that by subjecting them to the blowtorch of mass opinion, the best possible option, based on the combined wisdom of the citizenry, will arise.

It goes without saying that democracy often does not work like that. But it does often enough for democracies to deliver better material and social outcomes than any alternative. The great disadvantage of the democratic way is that it has no defence against the wilfully stupid. The rise of Ms Pauline Hanson is a case in point. Apart from any damage she may do to the civility of Australian society, she threatens our export industries and foreign investment — both near and dear to readers of this magazine — and there appears to be little to be done about it except to endure her.

Still, one can seek to understand. It seems to me that the central problem in Australia for the last twenty years has been that since the demise of Communism, there has only been one economic truth, that espoused by the Department of Finance in Canberra. There has been no serious attempt to create an alternative frame-work on which to build policy. So, with no debate to constrain its wildest excesses, the policies of economic rationalism have swept the land, leaving great efficiency, unemployment and misery in their wake.

It is a system that demands losers. You cannot have a managerial class that measures its success in terms of the number of jobs it has destroyed, without also having a class of people that used to have those jobs. You cannot systematically reduce rural services without creating disaffected rural dwellers. You cannot increase the absolute numbers living in poverty, without diminishing the average feeling of well-being in society.

So ultimately, in a democracy, economic rationalism is a system that contains the seeds of its own downfall. It was only a matter of time before there were so many mad, sad, angry people in Australia that they could form a political party and seek political redress. That is what the democratic process does best, and why we don't have bloody revolutions. It is Australia's enormous misfortune that the first serious challenger to the rhetoric of the Canberra mandarins is Ms Pauline Hanson and her inward-looking One Nation party.

Ms Hanson has been assiduous in identifying the cracks

in our society. But, it has to be said, doing so is hardly rocket science. The clever bit is proposing alternative policies that actually make sense. So far, Ms Hanson has not put up a single proposal that merits serious consideration.

Her industry policy is a case in point. She plans to promote investment by offering bank loans at an artificially low rate of interest. Obviously the policy will need to be funded. Either tax payers must pay for it, or the government must print money. So, she offers us more investment, but at the price of higher taxes or higher inflation. It is hardly an advance.

A second policy is the maintenance of import restrictions to shield the economy from foreign competition. The most obvious result of this will be that foreigners will simply retaliate, endangering our \$40 billion export sector. They have already begun to attack our tourism industry.

Mind you, it has to be said that Ms Hanson's self-evident dislike for the citizens of the nations that are our chief trading partners is likely to do Australia's export industries more damage than her economic policy, such as it is. It's hard to see why an Asian businessman would want much to do with supporters of Ms Hanson.

The biggest danger of Ms Hanson is that people will be deluded into thinking that her party represents the only possible response to economic rationalism and globalisation. It doesn't. In fact, Mr Rupert Murdoch, an ex-Australian publisher, hit the nail on the head in a speech in New York recently. Australia, he said, must be less supine in its dealings with the US. Indeed! We might start by not importing its ideology quite so readily.

We might start by recognising that the ideology of globalisation started in the US. It took off there — and was popularised all over the world — by US economic interests for the perfectly obvious reason that it is an ideology that works in favour of big, rich economies like that of the US (and Japan or Europe). It does not work quite so well in small economies like ours.

What we need is a politician with Hanson's appeal to articulate a rational non-rationalist view of the future. It will need to be a view that recognises that, while more trade is not always the answer, Australia's future is as a trading nation. It is impossible to base an effective modern economy on a population of 20 million. We need the world, and the new people, and the new ideas that come with them.

# Double fault for Intel's server

**I**t is almost becoming a tradition now that if Intel launches a processor, a major bug comes to light just prior to the launch. Just as it was at the launch of the Pentium II a year ago, questions about bugs in the Xeon processor were flying at its launch.

The company is unperturbed, saying it is a very normal thing, a microcode patch has been released, and no hardware changes are required. In fact, a look at the Xeon product specification shows it is indeed a very normal thing. Thirty seven errata are listed in the document.

The Xeon will take over from the Pentium Pro and is specifically designed for mid-range and higher workstations and servers. It incorporates features that will cope better with Internet services, corporate data warehousing, digital content creation, and electronic and mechanical design automation. It has done this with larger and faster L2 caches, multiprocessing capabilities and a 100MHz system bus. Systems based on the Xeon can be configured to scale to four or eight processors and beyond.

It is built using 0.25 micron P6 microarchitecture and offers Intel's extended server memory architecture. This provides full 36-bit addressing support from the processor, level one and two cache,



**Intel's Pentium II Xeon processor is the first in a new family designed to meet the demands of mid-range and higher servers and workstations.**

and chip set. Together, they provide a non-intrusive evolutionary path for enterprise applications that need to exploit more than 4GB of memory. Like the Pentium II it will come in the SECC (Slot 2) package

and will feature MMX technology.

A number of OEMs, including Acer, Compaq, Dell, HP, IBM and UMAX announced their support for the new processor at the launch.

## Victorian students get semiconductor training

**T**he Victorian government has announced its Chipskills Program, which will train Victorian students in design for the semiconductor industry. The announcement follows the decision by Korean based Anam to establish a semiconductor design centre in Melbourne called, Semiconductor Technologies Australia.

The program will involve Semiconductor Technologies Australia, the Victorian Government, seven universities and the Technical and Further Education sector.

"The design and manufacturing activities associated with semiconductors require very high levels of specialised

skills. While many countries can offer financial incentives, land and like inducements, a key determinant for semiconductor industry development is the timely availability of the specialised skills required," said Victorian Minister for Information Technology and Multimedia Alan Stockdale.

"To put these needs in perspective, just one large chip production facility can employ around 3,000 people of which around 750 are specially qualified engineers, 750 are skilled technicians and the remaining 1,500 are skilled operators. Upskilling of this magnitude requires a major and innovative approach. It par-

ticularly requires constructive co-operation between our universities and TAFEs."

The focus of the program is on developing post graduate courses in semiconductor technology as this is seen as the quickest way of increasing the skills of the large numbers of engineers which would be required by the any major semiconductor facility investment.

Semiconductor Technologies Australia is providing 50 sets of design tools to the Chipskills member universities and TAFEs and is implementing a program of design tool training with these institutions, both at the institutions and at its Victorian Semiconductor Design Centre.



**MOTOROLA**

What you never thought possible.™

### Smartcards

- smart solutions

<http://www.motorola.com.au/business-units/sps/index.html>

Enquiry No. 1305

# PAPST FANS

## KEEP YOUR COOL - DON'T SACRIFICE QUALITY

PAPST have over 40 years experience in the design and manufacture of AC and DC fans and blowers. Adilam has an extensive range in stock to solve all your cooling needs.

VOLTAGE: 115, 240 VAC and 12, 24, 48 VDC  
SIZES: 40, 60, 80, 92, 119, 135 mm square and  
150, 172 mm round units.



**Adilam  
Electronics** Pty.  
The Component Specialists

- Capacitors • Connectors • Fans • Filters • Headers • Plugs • Rectifiers • Relays •
- Resistors • Semiconductors • Sockets • Switches • Terminal Blocks • Varistors •

HEAD OFFICE: MELBOURNE 3 NICOLE CLOSE, NORTH BAYSWATER VIC 3153 PO BOX 664, BAYSWATER VIC 3153  
Telephone (61 3) 9761 4466 Facsimile (61 3) 9761 4161 Freecall 1800 800 482 Freefax 1800 244 161

BRANCH OFFICES:

SYDNEY

Tel: (61 2) 9584 2755  
Fax: (61 2) 9584 2789

ADELAIDE

Tel: (61 8) 8212 6665  
Fax: (61 8) 8212 6667

BRISBANE

Tel: (61 7) 3377 9555  
Fax: (61 7) 3876 7866

CHRISTCHURCH

Tel: (64 3) 366 2577  
Fax: (64 3) 366 2477



Enquiry No. 1306

# Thumbs up for Alcatel move

The Australian Telecommunications Industry Association (ATIA) has applauded Alcatel's decision to outsource its Australian telecommunications manufacturing activities to Bluegum Technologies, saying it is "a reaffirmation that Australia can match it with the rest of the world in electronics manufacturing".

The Association said the contract assembly industry is now the fastest growing sector of the electronics hard-

ware industry and is estimated to be worth \$450 million with growth exceeding 50% per annum.

"Alcatel's decision to keep manufacturing onshore, coupled with recent announcements such as JNA's outsourcing contract with Australian Electronic Manufacturing Services for the Opal product demonstrates the competitive strengths of the Australian electronics industry in supplying advanced and complex telecommunications products," it said. ●

# Tektronix recalls scopes

Tektronix has announced it is recalling all its TDS210 and TDS220 oscilloscopes because of a fault that could lead to electrocution if incorrectly used.

If a user incorrectly connects a probe ground lead to a voltage source or incorrectly touches the ground ring near the probe tip to a voltage source, a circuit board trace in the oscilloscope's ground path may open. Once this occurs, the product may appear to function normally but the unit is no longer properly grounded and use could result in a potentially fatal electric shock.

The recall applies to approximately 60,000 units. For the TDS210, it covers

serial numbers below BO49400 or CO10880. For the TDS220, it is serial numbers below BO41060 or CO11175.

Jimmy Hong of Tektronix said that, as far as he knew, no one had been injured due to the defect and, provided it is used correctly, the product is safe.

However, customers should stop using the recalled oscilloscopes immediately and contact Tektronix to receive instructions on how to return the product for modification.

You can contact Tektronix Australia on 1800 023 342 extension 193 or by visiting the company's web site on [www.tek.com/measurement](http://www.tek.com/measurement). ●

## "From sensor to report"

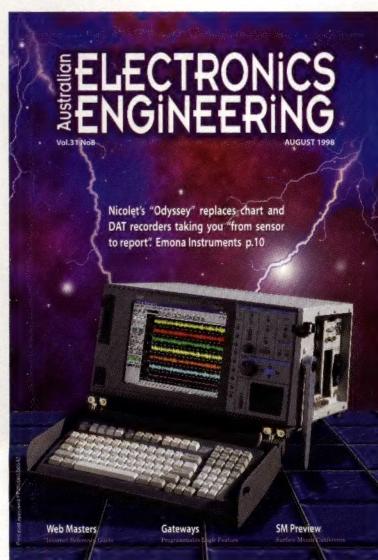
**W**ith more acquisition performance than a dozen PC cards and more storage than 20 DAT cassettes, the Odyssey from Emona Instruments is the first data acquisition system that lets you truly replace your old chart recorders and instrument tape recorders.

The Nicolet Odyssey takes you "from sensor to report" in one instrument, with integrated signal conditioning, data acquisition, data review, analysis and reports.

The Odyssey mainframe will record up to 32 analogue and 32 digital channels (or by clustering Odyssey units you can record hundreds or even thousands of channels) at 100,000 samples/second for over half an hour. Fast playback and search lets you zoom in on events of interest, analyse waveforms, and produce fully customised reports — even while still recording.

The Windows control and display software gives you all the advantages of a graphical operating system: point-and-click convenience, familiar menus, online help, and a wide selection of printers, archive media and networks. The Odyssey front panel also lets you control the unit without ever touching the mouse if you prefer.

Enquiry number: 1300



## Fluke accreditation

Philips Test & Measurement has announced that its supplier Fluke is the first US electronics company to receive Deutscher Kalibrierdienst (DKD) accreditation for both its standards laboratory and calibrator production facilities. The company says the uniqueness of the accreditation comes from unprecedented cooperation between the US National Voluntary Laboratory Accreditation Program and the DDKD.



Fluke's German standards accreditation may help break down some of the barriers between international standards accreditation.

## Axion gets Seho

Axion Australasia has announced it is now the sole distributor of German soldering systems manufacturer Seho. The company produces wave soldering equipment with flexible systems, selective soldering with laser or mini-wave technology, and reflow soldering with full convection or condensation. Axion was previously just responsible for Seho service.

## M+H on the move

M+H Power Systems has relocated its main distribution warehouse in Melbourne to 9 Mosrael Pl, Rowville. The new premises have 700m<sup>2</sup> of high rack warehousing with room to expand a further 700m<sup>2</sup> in the near future. The new phone number is (03) 9763 0555 and fax is (03) 9763 0577.

## Eltek signs PK deal

Eltek Pacific has been chosen by PK Electronics to be its Australian distributor. PK focuses on designing power solutions, including what it says is the world's first modular parallel redundant uninterruptible power system for high performance networks. Eltek will provide service and technical support for the products from its Sydney and Brisbane offices.

**Introducing**

**ITW Pancon** &

Formerly **PANDUIT** Electronic Connector Division

**SOANAR**  
electronic component solutions

# Your Performance Connection

ITW Pancon, formerly Panduit Electronic Connector Division, has named Soanar Limited as their exclusive distributor in Australia and New Zealand.

## HI-CON™

### DIN 41612 Connectors

Broad line of products in a variety of termination styles including solder, press fit, and insulation displacement (IDC).

## LAT-CON™

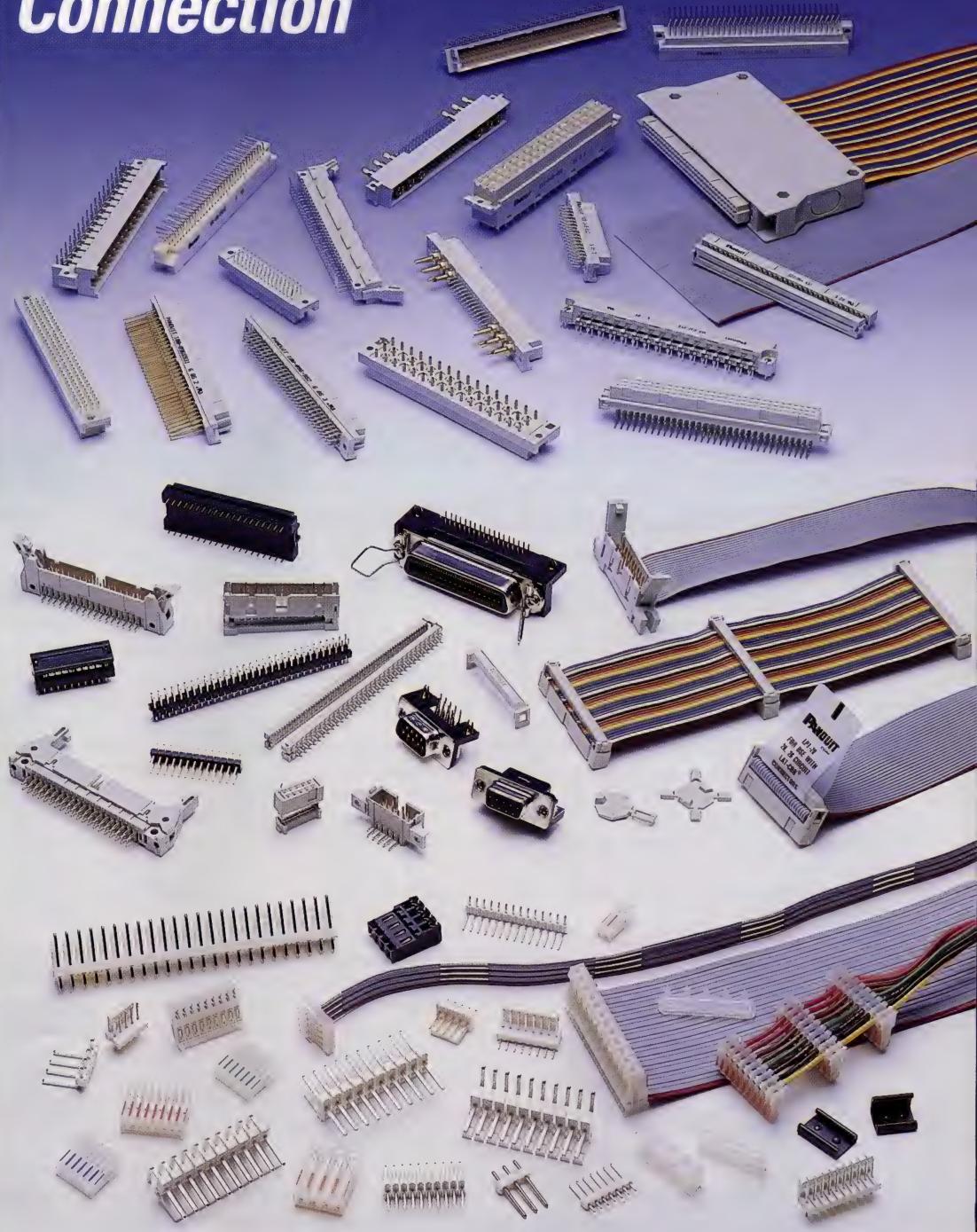
### .050" Flat Cable IDC Connector System

Patented lateral cable entry for faster termination and reduced scrap.

## MAS-CON®

### .100" and .156" IDC Connector Systems

Terminates to discrete wire and flat cable in a variety of wire gauges.



A full line of accessories and high quality application tooling is available to support all product lines.

**SOANAR**  
electronic component solutions

[www.soanar.com](http://www.soanar.com)

### AUSTRALIA

Free Call: 1300 365 551  
Free Fax: 1300 365 559

Enquiry No. 1307

### NEW ZEALAND

Free Call: 0800 762 627 (0800 SOANAR)  
Free Fax: 0800 329 767 (0800 FAXSNR)

# Fibre centre for Melbourne



Robert Jarvis

Cable manufacturer AMP has announced it will increase emphasis on fibre management systems (FMS) products and is creating an FMS Com-

petency Centre in Melbourne that will provide complete fibre interconnect systems solutions.

Australian AMP general manager Robert Jarvis said: "AMP's decision to invest in engineering and new product development here in Australia is an excellent fit. Australia has long been recognised as a leader in telecommunications and the deployment of fibre optics. The availability of a highly-trained well-educated workforce is a real plus, in addition to access to world-class R&D resources such as the Australian Photonics Cooperative Research Centre.

The decision is based on the company's acquisition of Fibernet in 1997. The company has recruited Brian Wright from Olex Cables to head both Fibernet and the FMS Competency Centre. Fibernet founder Dr Allen Conduit is now director of engineering for the FMS Competency Centre.

## **Victoria introduces E-Commerce legislation**

**V**ictorian Minister for Information Technology and Multimedia Alan Stockdale has released an exposure draft of an Electronic Commerce Framework Bill. In general the Bill operates on the principle of functional equivalence between electronic and manual signatures. It does not provide for the regulation of certification authorities but establishes an Electronic Signature Recognition Body.

The term 'Electronic Signature' is given a broad definition. It envisages a process of authentication applied by a person to a document in electronic form. The process must also have been applied for the purpose of signing the document. As the definition adopted is technology neutral, the framework is not limited to

authentication processes already in existence. It also does not favour one process over another.

The task of establishing authentication standards is left to the development of industry Codes of Practice. But the Codes will need to be approved by the Minister. It is envisaged that compliance with an approved code will provide adequate proof in court of the authenticity of the electronic signature.

Part of the Bill proposes to amend the Victorian Crimes Act to include new offences that deal with abuses of information stored on computers. Some of the offences created include:

- the deliberate unauthorised accessing of data;
  - the gaining of access to data where the offender has the intent to defraud;
  - the gaining of access to data where the offender knew or ought to have known that the data was of a sensitive nature.

Stockdale also announced proposed data protection legislation aimed particularly at consumer transactions on the Internet. It will be the first time any Australian Government has introduced such legislation. "Victoria has long stated the need for a national approach on this important issue and if the Commonwealth decides to proceed with suitable national legislation, Victoria will certainly offer its full support," he said

"These two draft Bills will provide the necessary legal framework and infrastructure for Victoria to be competitive and proactive in a global economy." ●

## Automation web site

### **National Instruments has announced its Automation Web site**

[www.natinst.com/automation](http://www.natinst.com/automation), designed specifically for industrial automation users. It contains information on how to connect systems to Fieldbus networks, interface PCs to CAN devices, integrate image acquisition into new or existing applications, and monitor and control industrial automation systems via the Internet as well as product information.



### The AutomationWeb site

## Pirelli wins Telstra contract

Pirelli Cables has been awarded a contract to supply Telstra's cable requirements until 30 June 2001. The value of the contract is believed to be in the \$200 to \$300 million range and covers optical and copper cables. "This contract represents a very important achievement for us," said Pirelli Cables CEO Italo Mazza. "The move from approximately 27% of Telstra's requirements to this new level will strengthen the company's position, giving the base for economies of scale."

## Engineering jobs

Engineering and technical resource companies Adecco Value Engineering and Jon & Associates have merged to form TAD Technical Careers and Contracts, which it claims is the world's largest engineering personnel resource company. The TAD name comes from a US company purchased by Adecco in 1997. TAD CEO Gary Cox said: "Whilst branded TAD, the Australian operation will maintain total autonomy. The only real link internationally will be the value asset of a global resource capability."

For more information on any of the products or advertisements in this issue, visit the AEE website  
[www.aee.com.au](http://www.aee.com.au)

Enquiry No. 1308

# If network breakdowns are continually making you *see red...*



© 1996 Hewlett-Packard Co. HP1280ADG

## It's time to take the bull by the horns.

The HP E6000A Mini-OTDR keeps your optical telecom and LAN/WAN networks up and running by pinpointing network faults and degradation faster. With the new ultra high-performance module, you get an unmatched, **guaranteed dynamic range of greater than 40 dB**, allowing longer measurement ranges than ever before.

Over shorter ranges, you can reduce measurement time from 180 seconds to under 10 seconds.

All this means the HP E6000A gives you serious capital and timesavings - and a competitive edge.

As if that wasn't enough, the HP E6000A has one-button operation, an award-winning\* intuitive user interface, and a superior scan trace algorithm for quick,

repeatable measurements. And a brand-new colour display means even new users can quickly make advanced reliable OTDR measurements on the first try - all at a price that fits your budget surprisingly well.

Contact the HP Test & Measurement Call Centre now! Finding faults has never been faster. Or more affordable.



\*iF Product Design Award and iF Interface Design Award 1997, by Industrie Forum Design Hanover, Germany

Australia 1800 629485  
New Zealand 0800 738378



**hp** HEWLETT<sup>®</sup>  
**PACKARD**  
Expanding Possibilities

Enquiry No. 1309



**Component distributor**  
Veltek, part of Arrow Australia, recently celebrated its tenth birthday. Seen at the celebrations were Arrow Australia regional director Greg Hansford (second from left), Zatek managing director Stewart Booth (centre) and executive vice president of Arrow Electronics Robert Klatel (far right).

## The Elegant Solution

SBS is going to present a 13 part television series on great engineering feats of our time. Shot in 16 different countries, the first episode will go to air at 6pm on 11 August.

## Siemens selling semiconductors

In the wake of Siemens' announcement that it was facing a loss of over 1 billion marks (more than A\$850 million) in its semiconductor business, the company is closing down that business. It will either shut down or sell its five factories, according to a report in Associated Press.

## IBM and ST join forces

IBM and ST Microelectronics have announced a joint effort to try and accelerate the development of advanced system on-chip products. The agreement includes the exchange of intellectual property including microprocessor and microcontroller cores, digital signal processors, memory blocks, communication cores, and sound and video cores. "Our joint efforts will accelerate the proliferation of single chip solutions and help spread the power of the information network to new user," said IBM Microelectronics general manager Dr Michael Attardo.

## Keeping tabs on the Net

Hewlett-Packard has released what it claims is the industry's first service management solution for Internet service providers. Its Firehunter software allows ISPs to monitor, measure and analyse key elements of the infrastructure on a single screen. H-P's Chuck Darst said ISPs were growing at a phenomenal rate and were finding it hard to get operators who understood the systems and how to quickly analyse problems with the system. "With this software, we are trying to track the user's experience," he said.

## Who cares?

Caring, sharing electronics industry types might be interested to know that in Austria a group has been formed called CARE (a Comprehensive Approach to Electronics Recycling), which is working on an environmental blueprint for the electronics industry. It has attracted the involvement of a number of companies including IBM, ICL, Matsushita, Motorola, Nokia, Nortel, Philips, Siemens and Sony as well as governments, recycling companies, industry associations and research institutes. In 2003 the electronics industry will be subject to an EU directive on waste arising from end-of-life electronics.

## Billions to be lost in 2000

The chairman of the federal government's Year 2000 steering committee Maurice Newman says a serious recession could result from a failure to deal with the Millennium Bug. He says if just 10% of small to medium-sized enterprises (SMEs) fail to deal with the bug, the country could lose \$12.5 billion and more than 350,000 jobs.

"It's not simple," he said. "There are no shortcuts and no silver bullet will save the day. All SMEs need to understand the scale and the potential for disruption. No organisation can assume that they will not be affected, either directly or indirectly. They must review their individual situation."

According to Australian Bankers Association CEO Tony Aveling, there is an

alarming sense of complacency with 80% of small businesses possibly affected but with only 22% of small and 15% of medium businesses preparing for the date change. "Microchip control systems are at the heart of many businesses," he said. "Lack of action could mean lack of business."

Ken Pritchard, program director of the Commonwealth Bank's millennium project, said he is replacing customers that are unable to provide proof of their preparedness for the date change. "Our systems are so interdependent that, even if your company is 2000-ready, the effects of non-compliant suppliers and customers could see many businesses suffer."

The government has set up a hot line 1800 11 2000 for more information. ●

## Electronics forum takes shape

The Australian Electrical and Electronic Manufacturers' Association has announced a national forum on the industry to take place on September 17-18 in Sydney. "The turnover of elec-

trical and electronic industries in Australia is vital to the nation's economic prosperity, a point not always well recognised, particularly at the political level," said AEEMA executive director Alex Gosman.

The forum will look at globalisation, deregulation, trade and emerging markets; emerging opportunities for the electronic and electrical industry; and threats to the operations of the telecommunications and energy sectors. Speakers will include federal treasurer Peter Costello and shadow minister for industry and regional development Simon Crean.

A feature of the forum will be the Sonar Great Debate where radio jock Alan Jones will join Gosman, Alcatel's Ron Spithill, NOIE's Paul Twomey, Cutler & Company's Terry Cutler and DIST's Alan Evans in discussing the question, "Who drives the direction and acts upon changes in the Australian electronics and electrical industry — the customer, the supplier, the manufacturer or the government?" ●

## Compliance Testing

**Comtest**  
LABORATORIES

1/570 City Road South Melbourne VIC 3205  
Ph: (03) 9645 5933 Fax: (03) 9645 5944  
Email: comtest@comtest.com.au



Enquiry No. 1310

# RAIL-TO-RAIL I/O FOR ONLY 0-60¢ PER OP AMP

RAIL-TO-RAIL<sup>®</sup> INPUTS & OUTPUTS

## MAX 4322 Family:

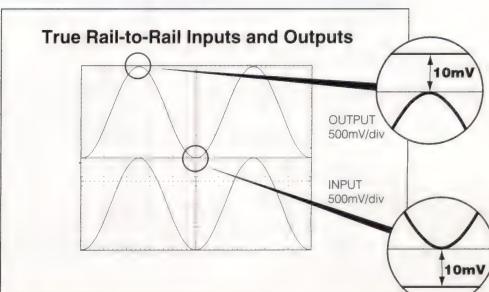
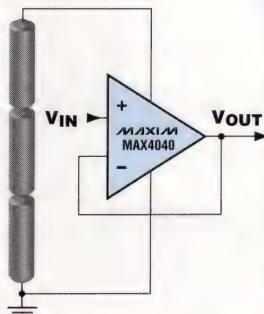
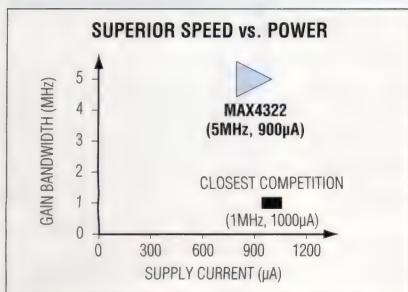
- ♦ Low cost 0-60¢ per Amplifier
- ♦ 5MHz GBW from Only 900µA max
- ♦ 25µA Shutdown Mode
- ♦ Drives 250Ω Loads



SINGLE-SUPPLY OPERATION DOWN TO 2.4V

## MAX 4040 Family:

- ♦ Low cost 0-60¢ per Amplifier
- ♦ 90kHz GBW from Only 18µA max
- ♦ 1µA Shutdown Mode
- ♦ Up to 200,000 Hours from 3 Cells



PART	NO. OF AMPS	GAIN-BANDWIDTH PRODUCT	SUPPLY VOLTAGE RANGE (V)	MAX IS PER AMP (µA)	OFFSET VOLTAGE (µV)	PRICE* (\$)	PIN-PACKAGE
MAX4040/41	1	90kHz	+2.4 to +5.5	18	250	0.63/0.71	5-pin SOT23, 8-pin SO/µMAX
MAX4042/43	2	90kHz	+2.4 to +5.5	18	250	0.86/0.94	8-pin SO/µMAX, 14-pin SO, 10-pin µMAX
MAX4044	4	90kHz	+2.4 to +5.5	18	250	1.37	14-pin SO
MAX4322/23	1	5MHz	+2.4 to +5.5	900	400	0.63/0.71	5-pin SOT23, 8-pin SO/µMAX
MAX4326/27	2	5MHz	+2.4 to +5.5	900	400	0.86/0.94	8-pin SO/µMAX, 14-pin SO, 10-pin µMAX
MAX4329	4	5MHz	+2.4 to +5.5	900	400	1.37	14-pin SO

Rail-to-Rail is a registered trademark of Nippon Motorola Ltd. \*100,000 units †Based on 100,000 units, Quad Package.

**FREE Op Amp/Comparator Design Guide—Sent Within 24 Hours!**  
Includes: Data Sheets and Cards for Free Samples



1998 EDITION!  
FREE FULL LINE DATA CATALOG  
ON CD-ROM

To receive your design guide, simply circle the reader response number, or contact your local Veltex Office.

**MAXIM**

<http://www.maxim-ic.com>



**VELTEK AUSTRALIA PTY. LTD.** 9 BASTOW PLACE, MULGRAVE VIC 3170

**VICTORIA**  
Tel: (03) 9574 9300  
Fax: (03) 9574 9773

**NEW SOUTH WALES**  
Tel: (02) 9745 1400  
Fax: (02) 9745 1401

**SOUTH AUSTRALIA**  
Tel: (08) 8271 0355  
Fax: (08) 8271 8918

**WESTERN AUSTRALIA**  
Tel: (08) 9472 3855  
Fax: (08) 9470 3273

**QUEENSLAND**  
Tel: (07) 3216 0771  
Fax: (07) 3216 0772

Veltex Australia is an AS9002 quality certified company

**VELTEK**  
AN ARROW COMPANY

<http://www.veltek.com.au>

**MAXIM** is a registered trademark of Maxim Integrated Products. © 1998 Maxim Integrated Products.

Enquiry No. 1311



# SMALLEST GaAsFET BIAS 1/2 SIZE OF 8-PIN SO

**Thin pMAX Package is 1.11mm High and Includes Power-OK**

The ultra-small MAX881R is a charge-pump inverter followed by a low-noise linear regulator that creates the negative bias voltage required for GaAsFET power amplifiers in cell phones and wireless handsets. Its input voltage range (2.5V to 5.5V) accommodates single-cell lithium-ion battery applications. A power-OK signal is available to control the GaAsFET power amplifier (PA) drain switch, protecting the PA from turning on before it is properly biased.

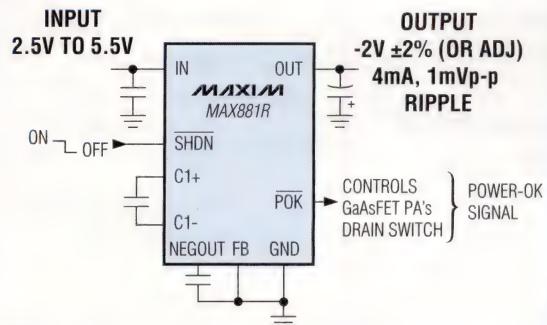
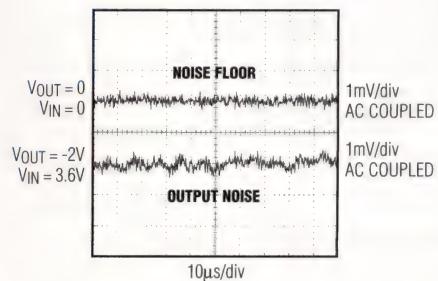
- ◆ Small, Thin pMAX Package:  
1/2 Size of an 8-pin SO  
1.11mm (max) Height
- ◆ Uses Three 0.22 $\mu$ F Capacitors and One 4.7 $\mu$ F Capacitor
- ◆ Power-OK Signal Controls Drain Switch to Protect GaAsFET Power Amplifier
- ◆ <1mVp-p Low-Noise Output Ripple
- ◆ 1 $\mu$ A Logic-Controlled Shutdown
- ◆ 2.5V to 5.5V Input Range
- ◆ -0.5V to -VIN Output Range
- ◆ EV Kit Speeds Designs

Complete GaAsFET Bias in  
1/2 the Size

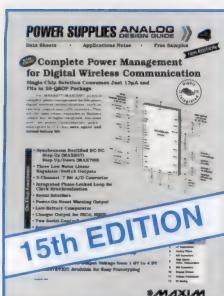
	MAX881R	MAX843
10- $\mu$ MAX		
AREA:	0.024in <sup>2</sup>	0.048in <sup>2</sup>
MAX HEIGHT:	1.11mm	1.75mm

## LOWEST NOISE BIAS SUPPLY FOR CELL-PHONE GaAsFETs

### OUTPUT NOISE AND RIPPLE



The MAX881R combines a fixed-frequency (100kHz) charge pump and a low-noise, low-dropout linear regulator to provide quiet (<1mVp-p) negative bias for GaAsFET power amplifiers.



**FREE Power Supply Design Guide—Sent Within 24 Hours!**  
Includes: Data Sheets and Cards for Free Samples

1998 EDITION!  
FREE FULL LINE DATA CATALOG  
ON CD-ROM



To receive your design guide, simply circle the reader response number, or contact your local Veltek Office.



<http://www.maxim-ic.com>



**VELTEK AUSTRALIA PTY. LTD.** 9 BASTOW PLACE, MULGRAVE VIC 3170

**VICTORIA**

Tel: (03) 9574 9300  
Fax: (03) 9574 9773

**NEW SOUTH WALES**

Tel: (02) 9745 1400  
Fax: (02) 9745 1401

**SOUTH AUSTRALIA**

Tel: (08) 8271 0355  
Fax: (08) 8271 8918

**WESTERN AUSTRALIA**

Tel: (08) 9472 3855  
Fax: (08) 9470 3273

**QUEENSLAND**

Tel: (07) 3216 0771  
Fax: (07) 3216 0772

Veltek Australia is an AS9002 quality certified company



AN ARROW COMPANY

<http://www.veltek.com.au>

MAXIM is a registered trademark of Maxim Integrated Products. © 1998 Maxim Integrated Products.

Enquiry No. 1312

# INTERNET

**Emona**

## EMONA Web

Australia's Leaders in Test & Measurement, Technical Training Equipment & Software.



Visit the Emona Web Site for the latest information on traditional & PC-based test instruments, CAD and educational software. Download demo versions of our popular software products and join the Emona e-News e-mail newsletter. Also, a secure ordering facility allows visitors to shop on-line with a selection of software and hardware on offer.  
[www.emona.com.au](http://www.emona.com.au)

**Columbus Group**

[www.oen.com.au/columbus](http://www.oen.com.au/columbus)

**Computronics**

[www.computronics.com.au](http://www.computronics.com.au)

**Comtest Laboratories**

[www.comtest.com.au](http://www.comtest.com.au)

**Data Electronics**

[www.datataker.com/~dtaker](http://www.datataker.com/~dtaker)

**Datacraft**

[www.dct.datacraft.com.au](http://www.dct.datacraft.com.au)

**Desktop EDA**

[www.desktop-eda.com.au](http://www.desktop-eda.com.au)

**Dewar**

[www.dewar.com.au](http://www.dewar.com.au)

**DGE Systems**

[www.dge.com.au](http://www.dge.com.au)

**Dindima**

[www.ozemail.com.au/~dindima](http://www.ozemail.com.au/~dindima)

**Don Alan**

[www.donalan.com.au](http://www.donalan.com.au)

**DSP Systems**

[www.dsp-systems.com](http://www.dsp-systems.com)

**ECE Logistics**

[www.ece.com.au](http://www.ece.com.au)

**EDA Solutions**

[www.eda.com.au/edasol](http://www.eda.com.au/edasol)

**Electro Optics**

[www.electro.oz.au](http://www.electro.oz.au)

**Electrolube**

[www.electrolube.com](http://www.electrolube.com)

**Electronic Development Sales**

[www.edsales.com.au](http://www.edsales.com.au)

**Elektron**

[www.memecbv.com.au](http://www.memecbv.com.au)

**Eltec**

[www.astec.com](http://www.astec.com)

**EMC Technologies**

[www.emctech.com.au](http://www.emctech.com.au)

**Emona Instruments**

[www.emona.com.au](http://www.emona.com.au)

**Environment Australia**

[www.environment.gov.au/net/](http://www.environment.gov.au/net/)

**EPIREZ Construction Products**

[www.epirez.com.au](http://www.epirez.com.au)

**Epson**

[www.epson.com.sg](http://www.epson.com.sg)

**Erico Lightning Technologies**

[www.erico.com](http://www.erico.com)

**Erni**

[www.erni.com.au](http://www.erni.com.au)

**Fastron Technologies**

[www.fastron.com.au](http://www.fastron.com.au)

**Festo**

[www.festo.com.au](http://www.festo.com.au)

**Fieldbus Specialists**

[www.fieldbus.com.au](http://www.fieldbus.com.au)

**Fineline**

[www.bahnhof.se/~visionics/](http://www.bahnhof.se/~visionics/)

**Future Electronics**

[www.future.com.ca](http://www.future.com.ca)

**GEC Electronics**

[www.gec.com.au](http://www.gec.com.au)

**George Lovitt Mfg**

[www.lovittools.com.au](http://www.lovittools.com.au)

**Hanna Instruments**

[www.hannainst.com](http://www.hannainst.com)

**HarTec**

[www.hartec.com.au](http://www.hartec.com.au)

**Fastron**

[www.fastron.com.au](http://www.fastron.com.au)

[Power Electronics Process Control Engineering Services](http://www.fastron.com.au)

[Fastron Technologies Pty Ltd Melbourne, Australia](http://www.fastron.com.au)

[Power Semiconductors Assemblies SCR Controllers](http://www.fastron.com.au)

[Fastron have 15 years experience in the research and application of Power Semiconductors. The main areas of interest are Power Electronics, Design and manufacture of the COTHERM brand of Thyristor Controllers used in electric heating control and the TRENT brand of Semiconductor Protection.](http://www.fastron.com.au)

Fastron provide components, products and solutions for the Power Electronic and Temperature Control markets. Their Web page provides a profile of the company's own manufactured products (with downloadable PDF datasheets available shortly) together with details of overseas principals and links to their web pages, new and established products, engineering capabilities, surplus stock lines, and a feedback page.  
[www.fastron.com.au](http://www.fastron.com.au)

**GEC Electronics**

**GEC Electronics**  
INNOVATIONS FOR THE FUTURE

GEC Electronics is a Value Added Distributor of electronic components, material, equipment, software and related products and services.

GEC Electronics supports the Australian and New Zealand regions.

The Division

GEC Electronics one of Australia's oldest and largest suppliers of electronic components, equipment, software and services.

GEC Electronics has a wide range of products and services.

GEC Electronics is an operating unit of TDK Electronics Limited, Australia.

STOP PRESS

TDK Leadless Inductor Kit. For design engineers.

KIC Electronics Web Page

Spare Stock - give us an offer (page 99)

Product Information Update Service - DataSTREAM

Product/Price Updates - Information on new

The website of GEC Electronics features an overview of the company with details of branches, technical notes and software, products and various press releases of products. Also featured are hyperlinks within the overseas suppliers overview for access to their respective data and application libraries.  
[www.gec.com.au](http://www.gec.com.au)

**Hewlett-Packard**

[www.hp.com](http://www.hp.com)

**Hitachi**

[www.hitachi.co.jp](http://www.hitachi.co.jp)

**Hi-Tech Software**

[www.hitech.com.au](http://www.hitech.com.au)

**HK Wentworth**

[www.electrolube.com](http://www.electrolube.com)

**HPM Technologies**

[www.hpmtech.com.au](http://www.hpmtech.com.au)

**Huber + Suhner**

[www.hubersuhner.com.au](http://www.hubersuhner.com.au)

**Hybrid Electronics**

[www.eisa.net.au/~hybelec/](http://www.eisa.net.au/~hybelec/)

**IICA**

[www.iica.org.au](http://www.iica.org.au)

**Imark Communications**

[www.imark.com.au](http://www.imark.com.au)

**In-Circuit Design**

[www.icd.com.au](http://www.icd.com.au)

**Insight**

[www.memecbv.com.au](http://www.memecbv.com.au)

**Instrument Data Communications**

[www.idc-online.com](http://www.idc-online.com)

**Integrated CAD Technologies**

[www.ict.net.au](http://www.ict.net.au)

**Integrated Silicon Design**

[www.isd-rfid.com.au](http://www.isd-rfid.com.au)

**Intelligent Systems**

[www.intelsys.com.au](http://www.intelsys.com.au)

**Interworld**

[www.ieci.com.au](http://www.ieci.com.au)

**IR Electronics**

[ourworld.compuserve.com/homepages/irelectronics~](http://ourworld.compuserve.com/homepages/irelectronics~)

**IRH Components**

[www.irh.com.au/~sal10](http://www.irh.com.au/~sal10)

**Jatco**

[www.ozemail.com.au/~jatco](http://www.ozemail.com.au/~jatco)

**JED Microprocessors**

[www.jedmicro.com.au](http://www.jedmicro.com.au)

**John Barry**

[www.lemo.ch](http://www.lemo.ch)

**Kenelec**

[www.kenelec.com.au](http://www.kenelec.com.au)

**Kingfisher**

[www.kingfisher.com.au](http://www.kingfisher.com.au)

**Koloona**

[www.koolona.com.au](http://www.koolona.com.au)

**Krone**

[www.krone.com.au](http://www.krone.com.au)

**LE Bougen**

[www.powerup.com.au/~bougen](http://www.powerup.com.au/~bougen)

**Lintek**

[www.lintek.com.au](http://www.lintek.com.au)

**Litton**

[www.litton-ps.com](http://www.litton-ps.com)

**M Rutty**

[www.mrutty.com.au](http://www.mrutty.com.au)

**M&H Power Systems**

[www.mhpower.com.au](http://www.mhpower.com.au)

**MacService**

[www.macservice.com.au/](http://www.macservice.com.au/)

**Marconi Instruments**

[www.marconi.com.au](http://www.marconi.com.au)

**Mayer Krieg**

[www.mayerkrieg.com.au](http://www.mayerkrieg.com.au)

**ME Technologies**



Simulation, design and synthesis software and computer measurement systems.

[www.midcoast.com.au/bus/me](http://www.midcoast.com.au/bus/me)

# WIRED FOR PERFORMANCE



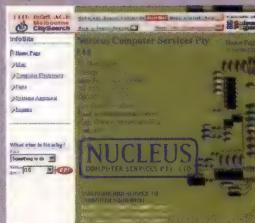
## Your Wired Solution.

[telecom@avnet-pacific.com](mailto:telecom@avnet-pacific.com)



# INTERNET

## Nucleus Computer Services



Nucleus Computer Services supplies a range of products for designing, building and testing computers and other electronic equipment. The company stocks a large range of Sunshine Device and Eeprom Programmers, PC Cards for DAQ industrial control and monitoring, and computer cables. Nucleus have been servicing customers for 18 years.

[www.nucleuscomputer.com.au](http://www.nucleuscomputer.com.au)

### MB&KJ Davidson

[www.davidson.com.au](http://www.davidson.com.au)

### ME Technologies

[www.midcoast.com.au/bus/me](http://www.midcoast.com.au/bus/me)

**Measure - Tech Supplies**  
[www.onthe.net.au/measuretech/](http://www.onthe.net.au/measuretech/)

### Meltec

[www.matson-meltec.com.au](http://www.matson-meltec.com.au)

### Memec EBV

[www.memecebv.com.au](http://www.memecebv.com.au)

**Mentor Technologies**  
[www.eda.com.au/mentortech/](http://www.eda.com.au/mentortech/)

### Microconsultants

[www.microconsultants.com](http://www.microconsultants.com)

### MicroTouch

[www.microtouch.com.au](http://www.microtouch.com.au)

### Mod Tap

[www.mod-tap.com.au](http://www.mod-tap.com.au)

### Morris

[www.morris.com.au](http://www.morris.com.au)

### Motorola

[www.motorola.com.au](http://www.motorola.com.au)

### Mtech Systems

[www.mtech.com.au](http://www.mtech.com.au)

### Multi-flex Circuits

[www.mfca.com.au](http://www.mfca.com.au)

## Rubin Group



[www.rubin.com.au](http://www.rubin.com.au)

### Namlea

[www.namlea.com.au](http://www.namlea.com.au)

### National Instruments

[www.natinst.com](http://www.natinst.com)

### National Semiconductor

[www.nsc.com](http://www.nsc.com)

### NEC

[www.nec.com.au](http://www.nec.com.au)

### Neo Products

[www.neoproducts.com.au](http://www.neoproducts.com.au)

### Netwatch

[www.clove.net.au/~netwatch/](http://www.clove.net.au/~netwatch/)

### NHP

[www.nhp.com.au](http://www.nhp.com.au)

### Nowack Engineering

[www.bit.net.au/~nowack](http://www.bit.net.au/~nowack)

### NSD

[www.memecebv.com.au](http://www.memecebv.com.au)

### Nucleus Computer

[www.nucleuscomputer.com.au](http://www.nucleuscomputer.com.au)

### Obiat

[www.obiat.com.au](http://www.obiat.com.au)

### Olympus

[www.olympus.com](http://www.olympus.com)

### Omnitronics

[www.omnitronics.com.au](http://www.omnitronics.com.au)

### Oz Electronics

[www.oem.com.au](http://www.oem.com.au)

## Soanar — take a look at us now!

Designed to provide a simple but effective resource, the recently launched [www.soanar.com](http://www.soanar.com) web site provides both Materials Management and Research and Engineering departments with information needed to make informed product choices from our comprehensive portfolio of suppliers.

Having strengthened our semiconductor product offering and added a range of interconnect, passive, and electromechanical products, our initial homepage is the beginning of a window to a vast array of services.

Currently, our home page covers areas such as Soanar the Company, Branch Locations, our Product Linecard and What's New as well as "hot links" to all of our major franchises. Emailing marketing or sales personnel within Soanar is also made easier by building them into our home page.

Having acknowledged the importance of the Internet as a business tool, Soanar will be constantly looking at ways of increasing the value offered by our homepage and continuously improving this business tool designed to make your life easier.

[www.soanar.com](http://www.soanar.com)

### SOANAR

Electronic Component Solutions

- Soanar the Company
- Branch Details
- What's New
- Line Card
- Promotions
- Downloads
- Tech News

### Actel

[www.actel.com](http://www.actel.com)

### ELNA

ELECTRICAL COMPONENTS

### KOA

[www.koa.com](http://www.koa.com)

### miniReel™

[www.minireel.com](http://www.minireel.com)

### MXIC

[www.mxic.com](http://www.mxic.com)

### NEC

[www.nec.com.au](http://www.nec.com.au)

### NOBLE

[www.noble.com](http://www.noble.com)

### PHILIPS

[www.philips.com](http://www.philips.com)

### SAMWHA

[www.samwha.com](http://www.samwha.com)

### SANWA

[www.sanwa.com](http://www.sanwa.com)

### SII

[www.sii.com](http://www.sii.com)

### Spectrol

[www.spectrol.com](http://www.spectrol.com)

### STANLEY

[www.stanley.com](http://www.stanley.com)

### TOKIN

[www.tokin.com](http://www.tokin.com)

### Pancon

[www.pancon.com](http://www.pancon.com)

### Saronix

[www.saronix.com](http://www.saronix.com)

### Coltronics

[www.coltronics.com](http://www.coltronics.com)

# POWER

# CORRUPTS

With the right protection in place, your circuit can withstand any variation in power supply. And STMicroelectronics have the right protection. As world leaders in semiconductor protection circuits, they offer low cost, reliable protection against transient overvoltage and overcurrent, lightning surges, electrostatic discharges and other dangerous transients.

Offered in a range of surface-mount and through-hole packages, devices include the following:

- **TRANSIL™** diodes provide high voltage protection by clamping action
- **TRISIL™** crowbar type protection diodes operate in short-circuit mode to provide very high surge current capability

• **APPLICATION SPECIFIC DISCRETE** (ASD™) devices for:

- Telecom applications e.g. line card & terminal protection
- Computer applications e.g. data line protection & bus termination
- Automotive applications e.g. reverse battery, overvoltage & load dump protection



The ST logo is a registered trademark of STMicroelectronics

<http://www.st.com>



**BRAEMAC**

Sydney  
Melbourne  
Adelaide

Tel: 02 9550 6600 Fax: 02 9550 6377  
Tel: 03 9540 0100 Fax: 03 9540 0122  
Tel: 08 8232 5550 Fax: 08 8232 5551

Perth Tel: 08 9443 5122 Fax: 08 9443 5262  
Brisbane Tel: 07 3862 3744 Fax: 07 3862 3977  
Auckland Tel: 09 486 5200 Fax: 09 486 4460

[www.braemac.com.au](http://www.braemac.com.au)

Enquiry No. 1314

# INTERNET

**Pacific Broadband Networks**  
[www.pbn.com.au](http://www.pbn.com.au)

**Passive electronics**  
[www.mcvan.com.au](http://www.mcvan.com.au)

**Peninsula Circuits**  
[wwwpcbfast.com](http://wwwpcbfast.com)

**Philips Components**  
[www.semiconductors.philips.com/](http://www.semiconductors.philips.com/)

**Philips T&M**  
[www.fluke.com.au](http://www.fluke.com.au)

**Plexus Technologies**  
[www.plexus-technologies.com](http://www.plexus-technologies.com)

**Powerbox**  
[www.powerbox.com.au](http://www.powerbox.com.au)

**Powertel**  
[www.powertel.com.au](http://www.powertel.com.au)

**Precision Circuits**  
[www.precisioncircuits.com.au](http://www.precisioncircuits.com.au)

**Priority**  
[www.pe.com.au/~priority](http://www.pe.com.au/~priority)

**Procon**

[www1.tpgi.com.au/users/p8king/](http://www1.tpgi.com.au/users/p8king/)

**Protel**

[www.protel.com](http://www.protel.com)

**Quality Assurance Services**  
[www.qas.com.au](http://www.qas.com.au)

**R&D Caruhn**

[www.ozemail.com.au/~caruhn](http://www.ozemail.com.au/~caruhn)

**R&D Electronics**  
[www.rdelect.com.au](http://www.rdelect.com.au)

**RAE**

[www.raez.com.au/~raez](http://www.raez.com.au/~raez)

## Step Electronics



STEP Electronics specialises in providing Satellite Communications Equipment and solutions. They are agents for leading manufacturers such as, Prodeline Inc (Antennas), ITT Locus (LNAs, HPAs), SSE Telecoms (Modems, Transceivers), Terrasat Inc (Power Modules), PTI (TWTs, Klystrons), Quest Microwave Inc (Isolators).  
[www.stepoz.com](http://www.stepoz.com)

## Trio Communications



Digital Radio Connectivity



- ANSETTE
- CUSTOMER SUPPORT
- DEDICATED PROJECT TEAM
- FLEXIBLE DESIGN
- INDUSTRIAL, TECHNICAL & REACH
- INTEGRATION
- PRE-DESIGN

Trio Communications Pty Ltd, Australian manufacturer of digital radio and microwave technology for the information technology and SCADA markets. Products include full/half duplex radio modems up to 9600 baud in the 400-520 & 800-960 MHz bands and Etherlink 10 Mbit/S microwave link. Overseas products include GMS, and Multipoint Networks (USA).  
[www.trio.com.au](http://www.trio.com.au)

### Ramelec

[www.ramelec.com.au](http://www.ramelec.com.au)

### Randata

[www.randata.com.au](http://www.randata.com.au)

### RCS Radio

[www.cia.com.au/rccradio/](http://www.cia.com.au/rccradio/)

### REC Instruments

[www.marconi.com.au](http://www.marconi.com.au)

### Redflex

[www.redflex.com.au](http://www.redflex.com.au)

### RFI Industries

[www.rfi-ind.com.au](http://www.rfi-ind.com.au)

### Ricon

[www.hutch.com.au/~ricon/](http://www.hutch.com.au/~ricon/)

### Rohde & Schwarz

[www.rsd.de](http://www.rsd.de)

### Rojone

[www.rojone.com.au](http://www.rojone.com.au)

### Rubin Group

[www.rubin.com.au](http://www.rubin.com.au)

### RVB

[www.rvb.com.au](http://www.rvb.com.au)

### Secure Network Solutions

[www.securenets.com.au](http://www.securenets.com.au)

### Selby Scientific

[www.selbybiolab.com.au](http://www.selbybiolab.com.au)

### Selby-Biolab

[www.selbybiolab.com.au](http://www.selbybiolab.com.au)

### Siemens

[www.siemens.com.au](http://www.siemens.com.au)

### Signal Processing

[www.spa.com.au](http://www.spa.com.au)

**Skandia**  
[www.skandia.com.au](http://www.skandia.com.au)

**SMCBA**  
[www.smca.asn.au](http://www.smca.asn.au)

**Soanar**

[www.soanar.com](http://www.soanar.com)

**Southco Fasteners**  
[www.southco.com](http://www.southco.com)

**Southern Graphtec Systems**  
[www.ozemail.com.au/~sgsmelb](http://www.ozemail.com.au/~sgsmelb)

**Specialised Technical Services**  
[www.sts.com.au](http://www.sts.com.au)

### Statronics

[www.hare.net.au/~statronics](http://www.hare.net.au/~statronics)

### Step Electronics

[www.stepoz.com](http://www.stepoz.com)

### Support Components

[www.supportcomponents.com.au](http://www.supportcomponents.com.au)

### Sydac Software

[www.sydac.com.au](http://www.sydac.com.au)

### Tech Rentals

[www.techrentals.com.au](http://www.techrentals.com.au)

### Techmetal Industries

[www.techmetal.com.au](http://www.techmetal.com.au)

### Tektronix

[www.tek.com](http://www.tek.com)

### Tenrod

[www.tenrod.com.au](http://www.tenrod.com.au)

### The PCB Company

[www.cadint.se](http://www.cadint.se)

### Transcat

[www.transcat.com](http://www.transcat.com)

### Trio Communications 2000

[www.trio.com.au](http://www.trio.com.au)



Virtual Logic is a leading independent electronic and software engineering company. Their web site shows an extensive range of their research and development projects, and customers. An informative overview of the Development Process shows how a structured approach to development, as evidenced by their ISO9001 Quality system, can eliminate many of its risks and costs.  
[www.vl.com.au](http://www.vl.com.au)

## VME Systems



VME Systems specialises in industrial and real-time computing. Our site includes an extensive library of product datasheets in PDF format. You will find information on FlashDisks, PowerPC, 68K and Intel Processor Boards, DSP boards, Industry Packs, Memory, NTDS, Analogue and Digital I/O, Reflective Memory, Backplanes and Enclosures.  
[www.vme.com.au](http://www.vme.com.au)

### Tronic Bits

[www.tronicbits.com.au](http://www.tronicbits.com.au)

### Unitronix

[www.unitronix.com.au/](http://www.unitronix.com.au/)

### Vaisala

[www.vaisala.com](http://www.vaisala.com)

### Veltek

[www.veltek.com.au](http://www.veltek.com.au)

### Vipac

[www.vipac.com.au](http://www.vipac.com.au)

### Virtual Logic

[www.vl.com.au](http://www.vl.com.au)

### Vishay

[www.vishay.com](http://www.vishay.com)

### Vision Abell

[www.vsl.com.au/abell](http://www.vsl.com.au/abell)

### VME Systems

[www.vme.com.au](http://www.vme.com.au)

### W&B Instruments

[www.wandbinstruments.com.au](http://www.wandbinstruments.com.au)

### Wandel & Goltermann

[www.wg.com](http://www.wg.com)

### Westek

[www.schaffner.com/](http://www.schaffner.com/)

### Yokogawa

[www.yokogawa.co.jp/Measurement/English/](http://www.yokogawa.co.jp/Measurement/English/)

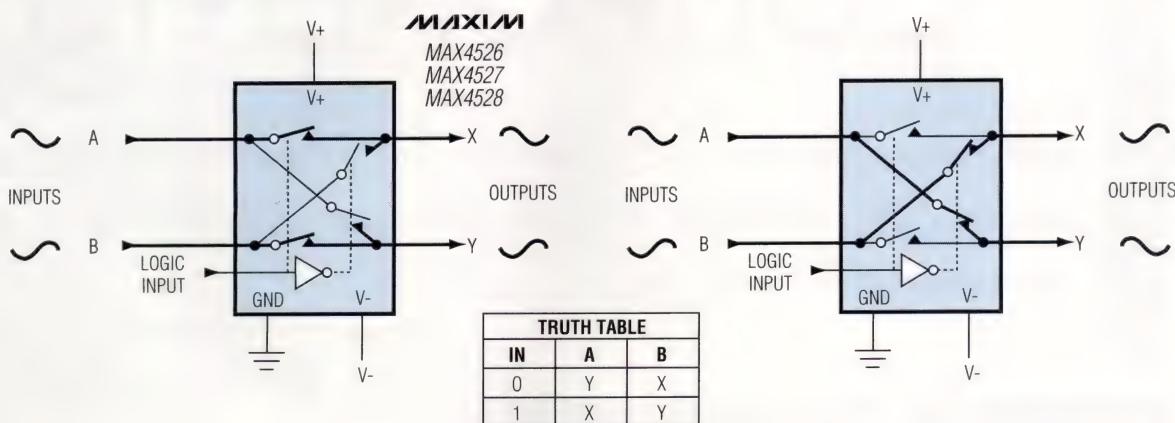
### Zatek

[www.arrowzatek.com](http://www.arrowzatek.com)

For more information on any of the products or advertisements in this issue, visit the AEE website [www.aee.com.au](http://www.aee.com.au)

# INDUSTRY'S FIRST PHASE-REVERSAL SWITCHES AVAILABLE IN 8-PIN $\mu$ MAX PACKAGE

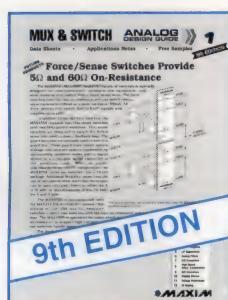
Four Matched SPST Switches Simplify Polarity/Wiring Phase-Reversal



The MAX4526/MAX4527/MAX4528 are phase-reversal analog switches consisting of two normally open and two normally closed CMOS switches arranged in a bridge configuration. These parts are designed to have matched t<sub>ON</sub>/t<sub>OFF</sub> times and charge injection (2pC max). They're ideal for use in lock-in amplifiers and synchronous demodulators. The bridge configuration also makes them easy to use in Auto Cal and VOS cancellation circuits and in polarity/wiring phase-reversal type applications. The MAX4526/MAX4527 are designed for  $\pm 15V$  applications, while the MAX4528 is optimized for low voltages ( $\pm 2V$  to  $\pm 6V$ ) and low power consumption. Each switch is designed for  $175\Omega$  max on-resistance and matched to  $8\Omega$ . All parts are available in commercial and extended temperature ranges in 8-pin  $\mu$ MAX, SOIC, and DIP packages. Logic inputs are TTL/CMOS compatible.

PART	TRANSITION TIME (ns max)	CHARGE INJECTION (pC max)	CHARGE-INJECTION MATCH (pC max)	LEAKAGE CURRENT (nA max)	SUPPLY CURRENT ( $\mu$ A max)	OPERATING SUPPLIES (V)
MAX4526	100	10	2	0.5	1000	$\pm 4.5$ to $\pm 20$
MAX4527	200	10	2	0.5	400	$\pm 4.5$ to $\pm 20$
MAX4528	200	5	2	0.5	1	$\pm 2.7$ to $\pm 6$

**FREE Mux & Switch Design Guide—Sent Within 24 Hours!**  
Includes: Data Sheets and Cards for Free Samples



To receive your design guide, simply circle the reader response number, or contact your local Veltek Office.

**MAXIM**  
<http://www.maxim-ic.com>

1998 EDITION!  
FREE FULL LINE DATA CATALOG  
ON CD-ROM



**VELTEK AUSTRALIA PTY. LTD.** 9 BASTOW PLACE, MULGRAVE VIC 3170

**VICTORIA**  
Tel: (03) 9574 9300  
Fax: (03) 9574 9773

**NEW SOUTH WALES**  
Tel: (02) 9745 1400  
Fax: (02) 9745 1401

**SOUTH AUSTRALIA**  
Tel: (08) 8271 0355  
Fax: (08) 8271 8918

**WESTERN AUSTRALIA**  
Tel: (08) 9472 3855  
Fax: (08) 9470 3273

**QUEENSLAND**  
Tel: (07) 3216 0771  
Fax: (07) 3216 0772

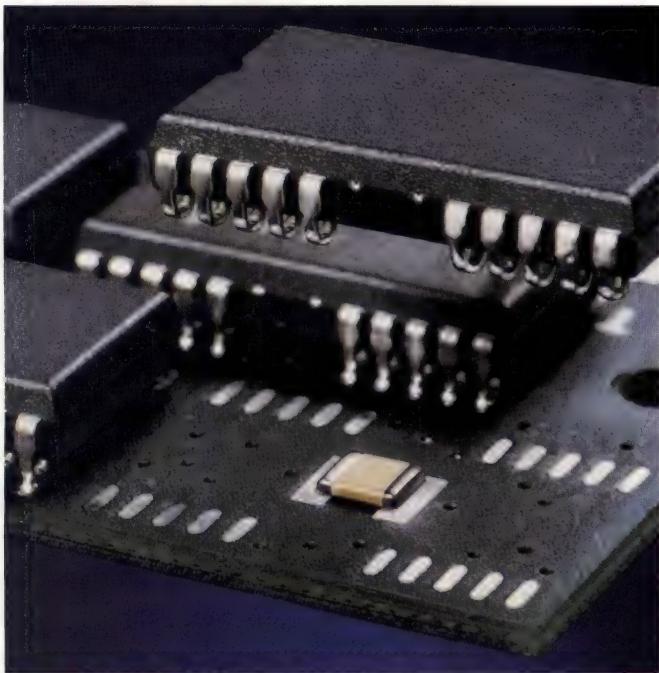
Veltek Australia is an AS3902 quality certified company

**VELTEK**  
AN ARROW COMPANY  
<http://www.veltek.com.au>

MAXIM is a registered trademark of Maxim Integrated Products. © 1998 Maxim Integrated Products.

# ELECTRONIC COMPONENTS

This month's product surveys features the latest electronic components. For more information on any item, see [www.aee.com.au](http://www.aee.com.au)



## SM chip capacitors

Captron has released the Johanson MemoryGuard series of low profile Z5U ceramic chip capacitors designed for memory de-coupling applications.

They are offered in three standard EIA case sizes (0805, 1206 and 1210) and four different device heights so they can be mounted directly beneath most memory packages. Capacitance selection includes standard decoupling values of  $0.12\mu F$  through to  $0.47\mu F$  with other values available on request. Standard packaging is in 8mm paper tape on 7in or 13in reels.

**Enquiry number: 1241**

## Single chip EEPROM

The Xicor X9400 family of electrically erasable potentiometers (EEPOTs) is available from R&D Electronics. They can be used in set-top volume control, cellular phone audio adjustments, LCD contrast controls, radio frequency tuning, laser diode bar code readers, engine controls, DVD players, etc.

The three family members include the X9400 with four EEPOTs, the X9410 with two EEPOTs and the X9420 with one EEPOT. Each EEPOT offers 64 different resistance settings which are written or read via a serial peripheral interface at 2Mb/s. Since the settings are stored in non-volatile, electrically erasable memory, they remain even when the device isn't powered.

The devices use embedded EEPROM to store up to four wiper positions for each potentiometer. The sixteen 6-bit registers that hold the wiper positions can also be used for general purpose non-volatile storage.

**Enquiry number: 1246**

## IGBT family

GEC Electronics has released the Mitel ITS range of discrete insulated gate bipolar transistors (IGBTs). They have been designed to bring low power dissipation and ease of operation to demanding inductive switching applications.

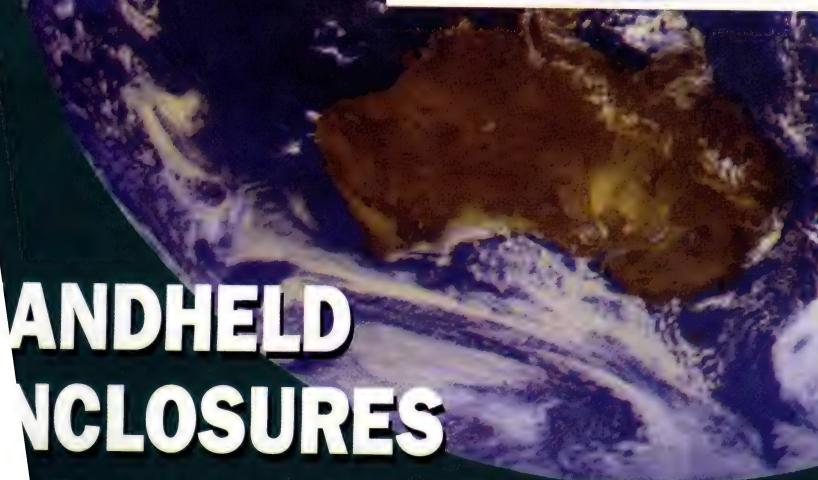
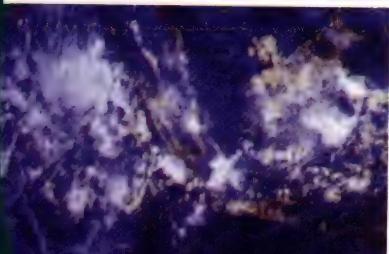
Products in the range feature a short circuit withstand time of  $10\mu s$  and a wide reverse bias safe operating area. Typical saturation voltage for the ITS40F06

For more information on any of the products or advertisements in this issue, visit the AEE website  
[www.aee.com.au](http://www.aee.com.au)

*Success in World Components*

**RUB**  
G R O U P

# BOPLA Enclosures



**HANDHELD  
ENCLOSURES  
FOR MAN TO MACHINE INTERFACE**

*Over 40 years of experience*

**GROUP PTY LTD** A.C.N. 000 091 145

133 King Street (PO Box 82)

WILLIAMSTOWN NSW 2064 SYDNEY AUSTRALIA

Tel: (02) 9906 5608 or 1800 620 960 Fax: (61+2) 9437 9225

# PRODUCT SURVEY

## ELECTRONIC COMPONENTS

is 2V at 35A with total switching losses of 2.8mJ at 35A. Devices can be selected to drive motors rated from 0.5hp to 10hp.

Available in industry-standard packages (TO-220, TO-247 and TO-264), the range comprises 600V and 1200V options rated from 8A to 60A. The products are available as single IGBTs or co-packaged with an integral anti-parallel diode.

**Enquiry number: 1243**

### Ferrite beads

Vishay Dale is offering a line of multilayer ferrite beads, designed for EMI/EMC filtering needs. The beads come in 0603 and 0805 surface mount sizes, complementing the standard 1206 size.

The multilayer ferrite product line also includes a high current low profile inductor (ILS-3825) designed for portable devices including notebook computers, PCMCIA cards and handheld products.

A feature of the products is a broad impedance range. The ILBB-0603 covers 30Ω to 1000Ω and the ILBB-0805 covers 11Ω to 2000Ω. Rated dc current for the 0603 is 50-400mA and 80-600mA for the 0805.

**Enquiry number: 1244**

### RF chokes



Westek Industrial Products has released the Schaffner RN-series of current compensated RF chokes suitable for PCB mounting. Typical applications include uninterruptible and switch-mode power supplies, dc-dc converters, etc.

The chokes are designed to provide high attenuation of common mode interference in the range of 100kHz to 3MHz while differential mode signals in the operating range encounter zero inductance. They employ toroidal ferrite cores to improve the inductance to volume ratio and dual current compensated windings to prevent core saturation when handling large peak currents.

The RN chokes are available for load current ratings from 0.3A to 10A with a voltage rating of 250V and path inductances ranging from 0.7mH to 100mH. They are available in low-profile or small footprint housings and withstand winding-to-winding and winding-to-housing voltages of 1500Vac and 4000Vac, respectively, for one minute.

**Enquiry number: 1242**

### Digital audio converter



Zatek has released the Texas Instruments TMS320AD90 digital audio converter. It is a 16-bit stereo audio codec that is fully compliant with Intel's AC'97 specification. The device also provides an integrated 600Ω power amplifier.

The device offers 94dB typical SNR on the DAC and 93dB SNR on the ADC. High quality FIR and Bessel linear phase filtering is also used. Typical current is less than 55mA total when the outputs are driving 10kW loads. In power down standby mode, it is 100mA.

Applications include video and audio conferencing, musical instruments and PC audio cards.

**Enquiry number: 1247**

### High precision op amp

Available through NSD, Burr-Brown's OPA277 series of high precision op amps replaces the OP-177. The new models offer lower offset voltage (20µV vs 25µV max) and lower offset voltage drift (0.15µV/°C vs 0.3µV/°C max) compared to the OP-177.

The series is suited to precision measurement of low-level signals such as those from thermocouples, strain gauges and bridges. An I<sub>Q</sub> of 800µA means they're also suitable for battery-powered instruments. They operate from ±2V to ±18V supplies.

The series is available in single (OPA277), dual (OPA2277) and quad (OPA4277) versions. The single and dual versions are available in 8-pin DIP and SO-8 surface mount packages. The quads come in 14-pin DIP and SO-14 surface-mount packages. Other features include an open-loop gain of 134dB, common mode rejection of 140dB, power supply rejection of 130dB and bias current of 1nAmax.

**Enquiry number: 1245**

### SOT-23 voltage reference

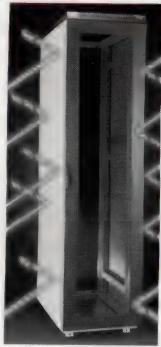
Available through ACD, the Linear Technology LT1460HCS3-2.5 and LT1460HCS3-5 precision series 2.5V and 5V bandgap references are now available in an SOT-23 package.

# MORE THAN U THINK

## NEW! VERAK EMC CABINET

- RFI screened rack
- High EMC performance
- IP capabilities up to 55
- Wide range of accessories

**VERO**  
VERO ELECTRONICS



## KM6-II SUBRACKS

- Fully compatible with DIN41494 and IEC 297-3 and IEC SC 48D. Conductive finish.



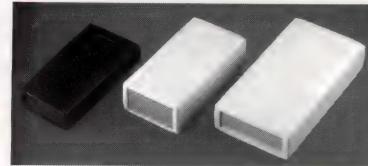
*KM6-II uses totally conductive components with many accessories available*

- Backplane or DIN41612 connectors.
- Pre-tapped holes and machine screws.
- Suits 160 and 220mm boards in 3U and 6U.
- Front or rear access.

**VERO**  
VERO ELECTRONICS

## VERONEX IP64 CASES

- 5 sizes and 9 heights
- Manufactured in UL94-V0 flame retardant high impact polystyrene
- Lightly textured, non-scratch surface.
- EMC cases with internal coating



**VERO**  
VERO ELECTRONICS

## Opto-Couplers to 10Mbit/s

- Phototransistor and photo-darlington output
- High voltage types
- 1 Mbit/s high speed transistor output
- 10 Mbit/s high speed logic gate output
- AC input types, Schmitt trigger, Logic output, non-zero-crossing triac output, Bilateral analog FET output, Photo SCR output.
- Variety of packages

**QT**  
OPTOELECTRONICS



## High Isolation Low Profile Power Relays

- Fujitsu FTR-H1 (SPDT) & FTR-F1 (DPDT) Series provide high isolation in a space saving low profile package only 28mm (L) x 12.8mm (W) x 16.5mm (H)
- 5,000 Vrms contact to coil
- FTR-H1 : 10A, 250Vac., 30Vdc (Res) SPDT
- FTR-F1 : 5A, 250Vac., 30Vdc (Res) DPDT
- Full range of coil voltages 5-48Vdc
- Conforms to Austel TS001-AS/NZS 3260 and international standards. 8 mm creepage



## Fujitsu Takamisawa

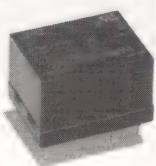
## Visible & Infra-Red LEDs

- Lamps, low current and resistor lamps
- Surface mount and PCB mounting
- Light bars and bargraphs
- Single and multi-digit displays
- Dot matrix displays 5x7, 5x8, 8x8
- Red, HER, yellow, orange, green and red/green
- Infra-red LEDs, PIN photodiodes and photosensors

**QT**  
OPTOELECTRONICS

## LZ Series High Power Relays

- Subminiature – 16.4x21.4x14.8mm
- UL, CSA & SEV recognised
- Switch up to 10A
- 1 Form A, C
- High sensitivity



**Fujitsu**  
**Takamisawa**

## Microcontrollers

F<sup>2</sup>MC 8-bit, high flexibility, low power with 136 instruction sets. 64kB memory space, 32 banks of registers. 9 address modes, 4 interrupt levels.

- ATM Chips
- Communications IC's

**FUJITSU**

## OptoMOS Solid State Switches

- No moving parts
- 2mW drive power (logic compatible)
- Loads up to 400Vac/dc and 1A
- Arc and bounce free with no snubbing circuit
- 3750Vrms input/output isolation
- No EMI/RFI generation
- Austel approved types

**CP Clare**



Look at our Home Page:  
<http://www.irh.com.au/~sal10>

**IRH** COMPONENTS

IRH Components Division,  
Bell-IRH Industries Pty Ltd

ACN 000 054 795

- |                                 |                      |
|---------------------------------|----------------------|
| Sydney :                        | Tel : (02) 9364 1766 |
|                                 | Fax : (02) 9648 3505 |
| Melbourne :                     | Tel : (03) 9888 8010 |
|                                 | Fax : (03) 9888 0280 |
| Adelaide :                      | Tel : (08) 8352 1200 |
|                                 | Fax : (08) 8352 7755 |
| Perth :                         | Tel : (08) 9478 4205 |
|                                 | Fax : (08) 9479 4884 |
| <b>TOLL FREE : 1800 25 2731</b> |                      |
| email :                         | sal10@irh.com.au     |

Enquiry No. 1317



Quality  
Endorsed  
Company

ISO 9002  
LRG 005 00501



The references are trimmed to a guaranteed initial accuracy of 0.2% and a maximum temperature drift of 20ppm/°C. They feature a 100µA supply current (125µA for the 5V version), reverse battery-protection at the input, and typical PC board solder shift of 0.02%.

With a minimum input/output differential of 0.9V it works effectively in low voltage applications. No output capacitor is required for stability and an output current of 20mA makes it suited for use as a low power precision voltage regulator. Applications include portable meters, precision regulators and data conversion applications.

**Enquiry number: 1249**

### Link layer chips



Zatek has announced four IEEE 1394 (FireWire) link layer interface devices from Texas Instruments.

The devices are the TSB12LV01 high speed serial bus link layer controller; TSB12LV21B (PCI-Lynx 2) IEEE 1394 to PCI bus interface; TSB12LV31 GP2Lynx; and TSB12LV42 DVlynx.

Optimised for 400Mb/s performance, the devices provide high speed data transmission for throughput intensive applications such as digital video and audio, and hard disk drives.

**Enquiry number: 1248**

### Low noise op amps

Veltek has released a range of Maxim low noise op amps. The MAX4104 is unity-gain stable and draws 20mA while delivering 880MHz bandwidth and 400V/µs slew rates. The MAX4304, compensated for a minimum gain of 2V/V delivers 730MHz and 1000V/µs.

The MAX4105 is compensated for 5V/V or greater gains and delivers 430MHz and 1400V/µs. While the MAX4305, compensated for 10V/V or greater, delivers 350MHz and 1400V/µs.

Input noise voltage density is 2.12.1nV/√Hz and spurious-free dynamic range of -84dBc making the devices suitable for low-noise low-distortion applications in video and telecommunications. They feature an output-voltage swing of ±3.7V and ±7mA output-current capability. The devices are available in 5-pin SOT23 and 8-pin SO packages.

**Enquiry number: 1250**

### Small DSPs

Insight has introduced the Analog Devices ADSP-218x family of digital signal processors. It includes the ADSP-2189L, ADSP-2187L and the ADSP-2183, which the company says is approximately 50% smaller than any other DSP available.

The ADSP-2183's 144-ball chip array packaging is 1.25mm high and covers 1cm<sup>2</sup>. It also features 0.8mA/MIPS performance. The 3.3V ADSP-2187L and the 2.5V ADSP-2189L both offer up to 1.5Mb of on-chip SRAM. They are suitable for portable handheld applications such as two-way paging, Internet appliances and cellular equipment.

**Enquiry number: 1251**

### 16-bit/20-bit A/D converters

Cirrus Logic's CS5501 and CS5503 CMOS A/D converters are suitable for measuring low-frequency signals representing physical, chemical, and biological processes, and are now available from Braemac. The devices use charge-balance techniques to achieve 16-bit (CS5501) and 20-bit (CS5503) performance with up to 4kHz word rates.

The converters continuously sample at a rate set by the user in the form of either a CMOS clock or a crystal. On-chip digital filtering processes the data and updates the output register. The converters' low-pass, 6-pole Gaussian response filter is designed to allow corner frequency settings from 0.1Hz to 10Hz in the CS5501 and 0.5Hz to 10Hz in the CS5503. So, each converter rejects 50Hz and 60Hz line frequencies, as well as any noise at spurious frequencies.

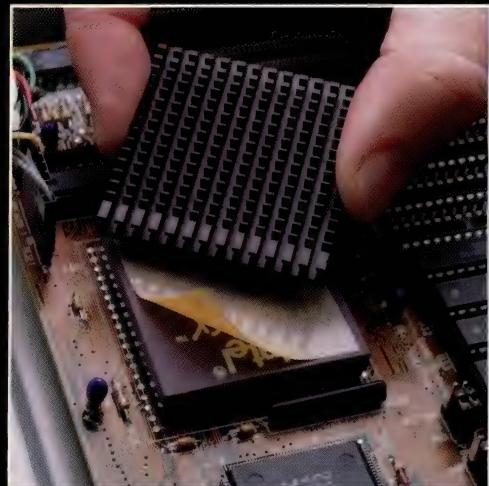
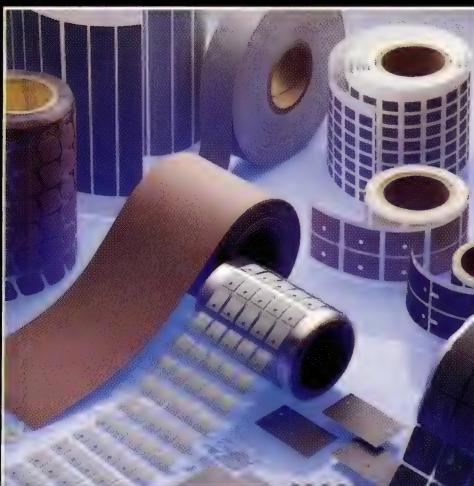
Each device's serial port offers two general-purpose modes of operation for direct interface to shift registers or synchronous serial ports of industry-standard microcontrollers. In addition, the CS5501's serial port offers a third, UART-compatible mode of asynchronous communication.

**Enquiry number: 1252**

For more information on any of the products or advertisements in this issue, visit the AEE website  
[www.aee.com.au](http://www.aee.com.au)

# THE WORLD LEADER IN THERMAL MANAGEMENT

NEW PRODUCTS  
FROM BERGQUIST R&D  
(ISO 9001 Certified)



## GAP PAD™

Gap Pad is a highly conformable pad designed to fill in air gaps between a heat sink and an electronic device or between PC boards and a chassis wall or other surfaces in your assembly. The range in thickness (from .020" to .160")



allows Gap Pad to be used in applications where surface textures vary and the space between surfaces is uneven. Pressure sensitive adhesive on one side provides a high tack surface for adhesion.

## Sil-Pad 400®

The original Sil-Pad and still the most widely used material for general applications.

## Sil-Pad 1000®

This material handles the real "hot spots" in your assembly with increased thermal performance.

## Sil-Pad 2000®

A direct replacement for ceramic wafers (BeO and Alumina).

## Q-Pad 3

For grease replacement where insulation is not required.

## Sil-Pad K4®, K6® and K10®

Kapton MT® gives this family of materials extra durability, high dielectric strength and high thermal performance.

## CPU PAD™

Bergquist CPU Pad is a thermally conductive, electrically insulating, double coated tape. The tape consists of a high performance acrylic, pressure sensitive adhesive, on both sides of a Kapton MT® film. This product can be used in applications that currently require clips. CPU Pad is typically used to mount a heat sink on top of a central processing unit on the circuit board.

New Product Catalogue

TJK TECHNOLOGIES

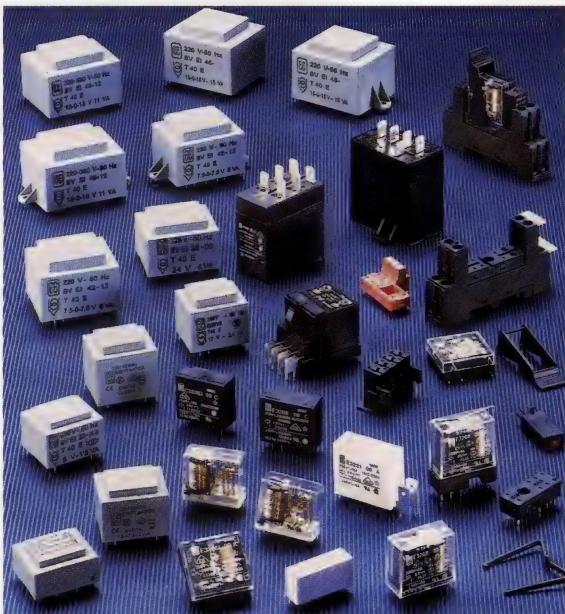
TJK Technologies  
2A, 11-13 Orion Road  
Lane Cove NSW 2066 Australia  
Tel: (61 2) 9418 6999 Fax: (61 2) 9418 6550  
E-mail: tjk@tig.com.au

THE BERGQUIST COMPANY

# PRODUCT SURVEY

## ELECTRONIC COMPONENTS

### Miniature relays



C&K Components Plus is offering a range of Celsa Eichhoff miniature and industrial relays for direct and alternating current. They are certified to European and American standards.

### Hall effect switch

The Cherry HE-6450 Hall effect vane switch is available from Adilam Electronics. It is designed for applications such as office equipment, business machines, fitness equipment, industrial controls, appliances and factory automation equipment. Housed in a plastic package, it is also suited to hostile electrical, chemical and mechanical environments.

It incorporates a temperature compensated Hall effect integrated circuit with a rare earth permanent magnet. A customer-provided ferrous metal interrupt or vane completes the sensing system. It is furnished ready for applications that use optoelectronic interrupts. The three-pin plastic housing with standard mounting holes has leads spaced at 1.27mm (0.05in) and a digital output. The housing also features a channel which defines the path the vane must travel.

The switch measures 24 x 6 x 11mm and is designed to operate in temperatures from -20°C to 85°C. Supply voltage can range from 4.5 to 25Vdc.

**Enquiry number: 1253**

### Op-amps for multimedia

Available in Australia through Braemac is SGS-Thomson Microelectronics' family of low-cost op-amps for multimedia applications. The TSH93

triple op-amp and the TSH94 and TSH95 quad op-amps are designed with an advanced BiCMOS process.

Key parameters include 150MHz bandwidth, 0.07° differential phase, 0.03% differential gain and 0.1dB maximum gain flatness at 6MHz. A slew rate of 110V/μs, a low noise figure, and a total harmonic distortion (at 1kHz) of only 0.01% coupled with outputs specified for 600 and 150 loads, make these devices suitable for a range of applications including satellite receivers (set-top-box), pay TV, audio equipment and industrial instrumentation.

Offered in both DIP16 and surface mount SO16 plastic packages (DIP14/SO14 for the TSH93), the devices operate over the -40 to 125°C temperature range with a 7-12 V supply range. A SPICE macro-model is included in the specification.

**Enquiry number: 1254**

### Chip inductors

IRH Components has released the Toko PTL series of chip inductors. The inductors are targeted at VCO, GaAs amplifier matching and notch filter applications.

The inductors are made using photolithographic etching. The company says the advantages of this method are: better temperature stability (150ppm/°C compared to 250ppm/°C); higher average Q values; and tighter tolerances.

**Enquiry number: 1294**

### Resistor-capacitor networks

Captron has introduced the Electro-Films RCN series of R/C networks. They are suitable for high frequency filtering applications such as the elimination of unwanted EMI/RFI radiation in high speed digital applications.

Although most applications require low value resistors, values up to 1MΩ are available along with capacitances up to 1000pF. The chip size necessary is proportional to the capacitance values. Resistance tolerances down to 0.1% and capacitance tolerances down to 5% are available.

**Enquiry number: 1295**

### 5-pin PWM

The Toko TK75001 is a 5-pin primary side controller integrated circuit available from IRH Components. The device can be used as a PWM for off-line power supplies. It incorporates adjustable slope compensation and a 1A drive with only five active pins.

The pin count reduction is possible through a multifunction feedback pin which combines a PWM/current control function, a built-in compensation ramp, and a pulse-by-pulse current limiter with frequency reduction (to prevent short circuit runaway).

**Enquiry number: 1296**

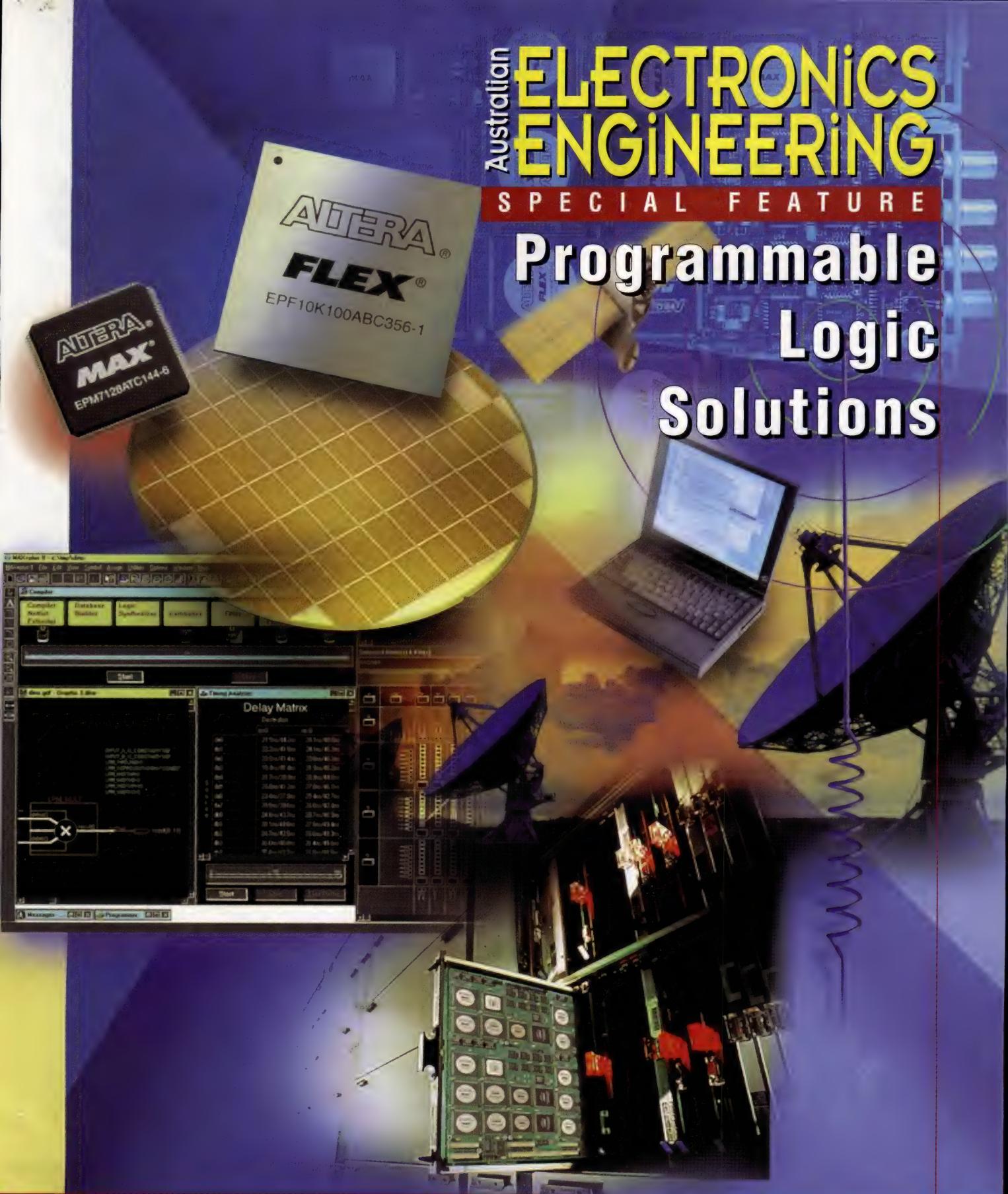
For more information on any of the products or advertisements in this issue, visit the AEE website  
[www.aee.com.au](http://www.aee.com.au)

Australian

# ELECTRONiCS ENGINEERING

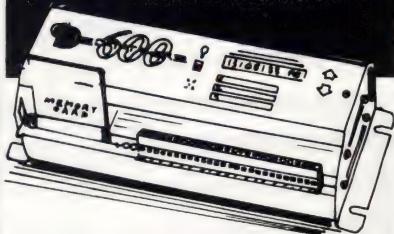
SPECIAL FEATURE

## Programmable Logic Solutions



Altera has the programmable logic solutions to take your designs into the next Millennium p35

## DATA MEASUREMENT SOLUTIONS



### Renting the DataTaker 605 is the answer

Australian Data Electronics loggers gather measurements for organisations ranging from Volvo to NASA, in locations as varied as Sweden and the Antarctic.

Important features include:

- Stand alone operation
- Inbuilt display
- RS232C and RS485 interfaces
- 30 analogue channels
- 4 digital channels
- 3 counter channels
- Expandable memory
- Comprehensive conditioning
- Multiple logger networking

Rent for as little as one day to a year or more.



For your copy of the '98  
Tech-Rentals catalogue,  
please contact:

**TECH  
RENTALS**  
AUSTRALIA'S INSTRUMENT  
RENTAL COMPANY

MELBOURNE	(03) 9879 2266
SYDNEY	(02) 9684 2344
BRISBANE	(07) 3875 1077
ADELAIDE	(08) 8344 6999
PERTH	(08) 9470 3644
CANBERRA	(02) 6253 1825
DARWIN	(08) 8947 2860
AUCKLAND	(09) 520 4759

Price & Payne 6815G

Enquiry No. 1320

# PROGRAMMABLE LOGIC

# IMPLEMENTING FPGAs

Ken O'Neill and Dave Wurthman discuss the implementation of performance-intensive designs in FPGAs.

Unleashing the performance capabilities of FPGAs is a tricky and often frustrating process. Even if one can find a part that is quick enough and one is willing to jump through all the hoops required to achieve that performance, getting data on and off chip fast enough is virtually impossible, so one is forced to break a critical portion of your logic out and drop it into a CPLD.

However, a new family of FPGAs developed by Actel are designed to be so fast one no longer need to implement workarounds to achieve performance.

times compared with equivalent CPLDs or FPGAs, for easy thermal and power supply design;

- reduces component counts and board space requirements.

Designs that were previously relegated to ASICs can now be implemented in SX FPGAs without compromising performance, or enduring lengthy prototyping and production times.

## Fast and Flexible New Architecture

This intrinsic high performance is achieved by a combination of low-impedance routing interconnect elements, segmented and local routing tracks, and finely-structured logic cells, optimised for fast and efficient mapping of synthesised logic functions. The unique routing structure gives fast,

predictable performance and allows 100% pin-locking with full logic utilisation, reducing design time and allowing designers to achieve performance goals with a minimum of effort. The flexible routing structure is complemented by a hard-wired, constantly-loaded clock network tuned to provide fast clock propagation with minimal clock skew.

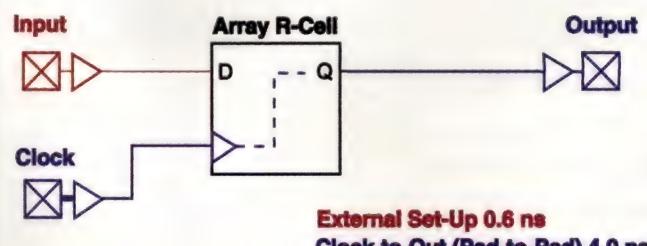
Additionally, the high performance of the internal logic has eliminated the need to embed latches or flip-flops in the I/O cells to achieve fast clock-to-out or fast input set-up times. The I/O cells do not require HDL instantiation, facilitating design re-use and reducing design and debugging time. Figure 1 illustrates

Figure 1: High-performance internal logic delivers fast clock-to-out and fast input set-up times without HDL instantiation.

## The Benefits of Speed and Capacity

The SX family offers internal clock speeds exceeding 320MHz, clock-to-out at 4.0ns, and pin-to-pin 25-bit decodes at 6.6ns. For designs which previously would be segmented between CPLDs (for speed) and FPGAs (for capacity), the combination of high density and high performance reduces the number of components required to implement a design. This:

- improves system reliability and eases system logic integration;
- lowers power consumption about two

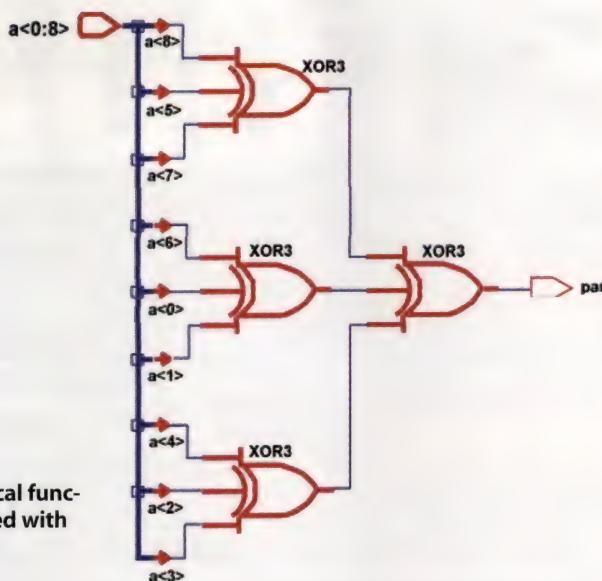


## Verilog Example for a Parity Tree

```
Module parity( a, par );
  input [0:8]a;
  output par;
  reg par;

  always @(*)
    par = ^a;

endmodule
```



**Figure 2: Performance-critical functions are easily implemented with SX devices.**

## VHDL Example of a Parity Tree

```
library IEEE;
use IEEE.std_logic_1164.all;
use IEEE.std_logic_arith.all;

entity parity is
  port(a : in std_logic_vector(8 downto 0);
       par : out std_logic);
end parity;

architecture behave of parity is
begin
  process (a)
    variable aux : std_logic;
  begin
    aux := '0';

    for i in 0 to 8 loop
      aux := aux xor a(i);
    end loop;

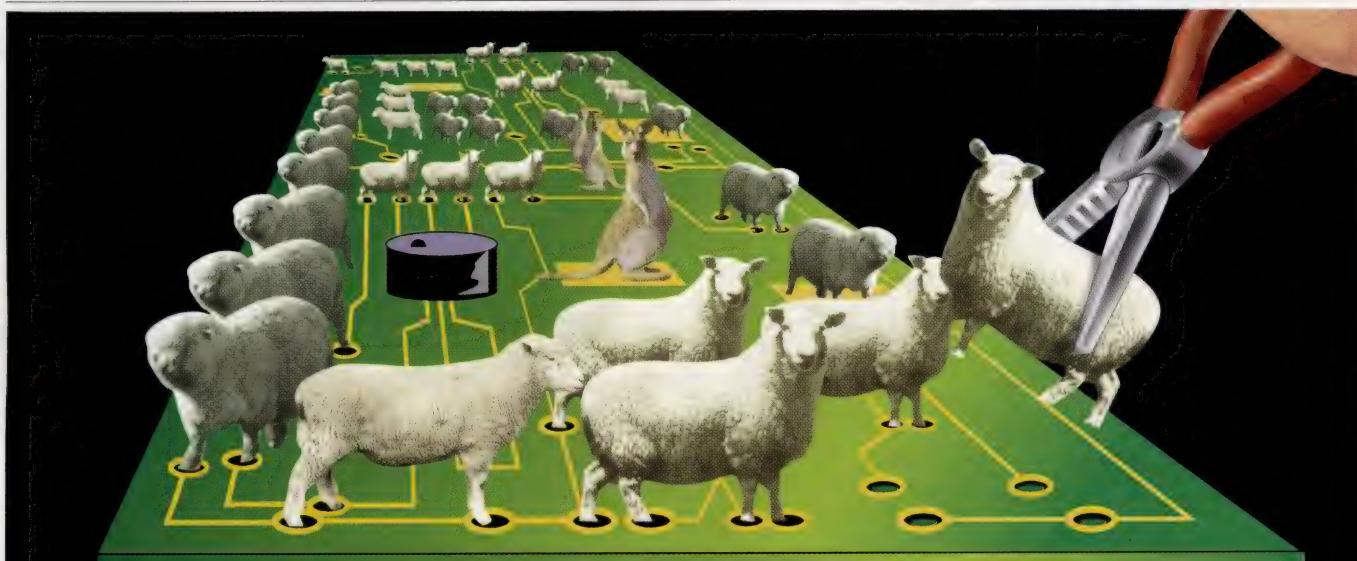
    par <= aux;
  end process;
end behave;
```

the fast clock-to-output and input set-up time.

SX devices enable a high level of performance without requiring complicated design techniques such as the use of

redundant logic to reduce fanout on critical nets, the introduction of data pipelining to reduce register-to-register delays, or the instantiation of structural macros in VHDL or Verilog-HDL code.

Simplifying a design also reduces the debugging process, which is further facilitated by ActionProbe device circuitry and Silicon Explorer software. Silicon Explorer probes 100 percent of the device



If Alpine of New Zealand had to place sheep, with high precision, on circuit boards, you can bet we'd find a way.

As the largest surface mount assembler in New Zealand we can place 10 million sheep, er, components on circuit boards a month. Our comprehensive range of modern equipment makes our plant one of the most sophisticated in the South Pacific. For highly competitive pricing and quality contract manufacturing services we are a real alternative and closer than you may think.

**COME TO WHERE THE GRASS IS GREENER - GIVE US A CALL AT ALPINE!**

CONTRACT MANUFACTURING DIVISION

Tel: 00 64 9 573 7100 • Fax: 00 64 9 573 7101 • E-mail: manufacturing@alpinenz.co.nz



**AWARD WINNING**  
Manufacturing Solutions

**ALPINE**®

GET YOUR OWN COPY OF

# AEE TODAY

## SPECIAL OFFER

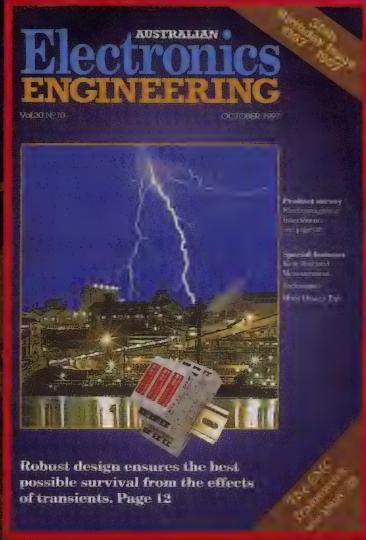
S U B S C R I B E T O D A Y

SAVE UP TO \$108

As a **PROFESSIONAL** working in the electronics industry you know information is one of your essential requirements for success...

Well, AEE is your **PREMIER** information source.

AEE is Australia's premier electronic business **MAGAZINE**, so you'll be kept right up-to-date with all the **LATEST** issues, news and products. Take a look through this issue you're reading right now - thorough, well-researched, quality information.



AND YOU'LL GET THAT EVERY MONTH.

S U B S C R I B E to AEE today and you can save up to \$108.00!

That's over 12 months of electronics information... **ABSOLUTELY FREE**

To take **ADVANTAGE** of this offer just fill out the coupon below and return to us via fax or free post, or simply call our Customer Service **HOTLINE** on **1 300 360 127** and we'll process your order immediately!



FAX to: (02) 9422 2633



CALL: **1 300 360 127**  
or (02) 9422 2755



Reply Paid 399  
Reed Business Information  
Locked Bag 2999  
Chatswood Delivery Centre  
Chatswood NSW 2067

E-mail:  
[hris.brookes@reedbusiness.com.au](mailto:hris.brookes@reedbusiness.com.au)  
REED  
BUSINESS  
INFORMATION  
A.C.N. 000 146 921

**YES!**

PLEASE ENTER MY  3 years (36 issues) for only \$159 - **SAVE ME \$108**  
 2 years (24 issues) for only \$129 - **SAVE ME \$49**  
 1 year (12 issues) for \$89

Mr/Mrs/ Ms \_\_\_\_\_ FIRST NAME \_\_\_\_\_ LAST NAME \_\_\_\_\_

Job title \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Suburb \_\_\_\_\_ Postcode \_\_\_\_\_

Phone \_\_\_\_\_ Fax \_\_\_\_\_

Attached is a cheque made out to AEE for \$\_\_\_\_\_ or please charge my:  Bankcard  Visa  Amex  Diners  Mastercard

Cardholders no:           Expiry date: \_\_\_\_\_ / \_\_\_\_\_

Card holder's name \_\_\_\_\_ Signature: \_\_\_\_\_

Please tick here if you do not wish us to pass on your name for direct mail promotions from other companies

Company's main business area: (please tick)

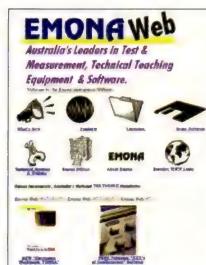
- Electronics equipment/components
- Industrial electronics
- Consumer electronics
- Automotive electronics
- Leisure industry
- Telecommunications
- Transportation
- Medical/hospital electronics
- Broadcasting
- Higher education
- Public utility/government department
- Research & development
- Contract manufacturing
- Computer systems/peripherals
- Defence
- Other:

**Also in this issue:**

- Release of Tektronix' Brilliant TX3 Digital Multimeter
- Release of the Matrix Digital Electronics Multimedia CD
- Release of the Acute 64 ch, 200MHz Logic Analyzers
- Release of the Polar FT-100 Fixtureless PCB Test System

**Emona Instruments Pty Ltd**

ACN 069 417 563

**web site:**www.  
emona.com.au**e-mail:**testinst@  
emona.com.au**NSW - Sales**86 Parramatta Road  
Camperdown NSW 2050

Tel (02) 9519 3933

Fax (02) 9550 1378

**VIC - Sales**1206 Toorak Road  
Burwood VIC 3125

Tel (03) 9889 0427

Fax (03) 9889 0715

**QLD - Sales**Suite 64, 283 Given Terrace  
Paddington QLD 4064

Tel (07) 3367 1744

Fax (07) 3367 1497

**WA - Sales**63 Shepperton Road  
Victoria Park WA 6100

Tel (08) 9361 4200

Fax (08) 9361 4300

**Also available from****SA** Wavecom Instruments  
Adelaide Tel: 8331 8892**TAS** Active Electronics  
Hobart Tel: 6231 0111**And over 35 Distributors**

Call your Emona State Office for the details of your local distributor

# EMONA News

**Electronic test equipment & software for industry and education.****EMC Test Equipment**

## The Complete Range of Affordable, Conducted & Radiated EMC Testing

Seaward Electronic of the U.K. have developed a suite of test equipment and accessories to enable manufacturers of electrical equipment carry out in-house EMC testing to meet Australian and international EMC regulations, covering the 9kHz to 1GHz frequency range.

**• SPECTRUM RECEIVER 1GHz Spectrum Analyser with LISN**

The latest addition to Seaward's EMC test range, the Spectrum Receiver is a unique package that forms the core element towards compliance for both radiated and conducted



emissions. The Spectrum Receiver is a PC controlled spectrum analyser with receiver mode and a built-in LISN. Near Field Probe is available.

**• SCEPTRE Spectrum Analyser with LISN**

Designed as an affordable 450MHz instrument to measure conducted and radiated emissions to both CISPR(AS) bandwidths and detector methods. Near Field Probe is available. Inbuilt 8A LISN.

**• EMC EXPERT CONSULTANT PC Software**

Guides the user through EMC standards and design diagnostics, test methods and provides interpretation.

**• MACE Mains Interference Simulator**

For testing Voltage Dips, Fast Transients to 4kV and Electrostatic Discharge to 8kV.

**• ORB Harmonics & Flicker Testing**

Designed for testing harmonics and Flicker - measurement of Pst and Plt.

**• THOR Surge Immunity Testing**

Injects 1.2/50 - 8/20 "Hybrid" Surges into L, N, E of the EUT. Fully programmable.

**• EASI-SCREEN EMC Test Chamber**

A lightweight, tent-like test chamber. Available in 2 sizes. Typical attenuation is 60-80dB from 1-1000MHz.

**• BICONICAL ANTENNA**

A complete package with antenna, balun, tripod and leads.

Control software provides automatic antenna factor compensation .

**• COUPLING CLAMP Cable Tester**

Used with MACE for electrical fast transient/burst testing of signal and other cables.

**• VOLTAGE PROBES for Spectrum Receiver**

Used for high current ac/dc conducted emissions testing.

**• ABSORBING CLAMP for Spectrum receiver**

Used to measure the interference on power leads to the equipment under test.

**• THE EMITTER for Spectrum receiver**

Used to verify the stability of the radiated emissions test site, antenna, cables and connectors.

**• Conducted/radiated emissions tests.****• Immunity and surge testing.****• Flicker and harmonics testing.****• In-built standards, CISPR (AS), EN55XXX.****• Complies with Australian and European standards (IEC801).**

Seaward

## PC-Based Instruments

# 64 Channel, 200MHz Logic Analysers

The new Acute LA1000 Series of high speed PC-based logic analysers operate under the familiar Windows™ 95/98/NT environment, making the instruments both easy to learn and easy to use.

Acute's LA1000 Series includes 4 high performance logic analysers, with 32 or 64 input channels.

Sample rate ranges from 100Hz to 200MHz. Available memory depths are 128K or 64K.

Each analyser comes as a complete hardware/software package with instrument mainframe, 16-bit AT Bus PC-interface card, signal isolation amplifier pods, operating software and probes.

The Windows operating software includes a full suite of high performance functions, such as complex multichannel triggering,



**NEW**

variable input threshold setting, timing analysis and state analysis.

As well, facilities such as zoom-in/out, save/load waveforms, output to clipboard or bitmap file, waveform printing and online Help are standard.

Acute

## Multimedia CD

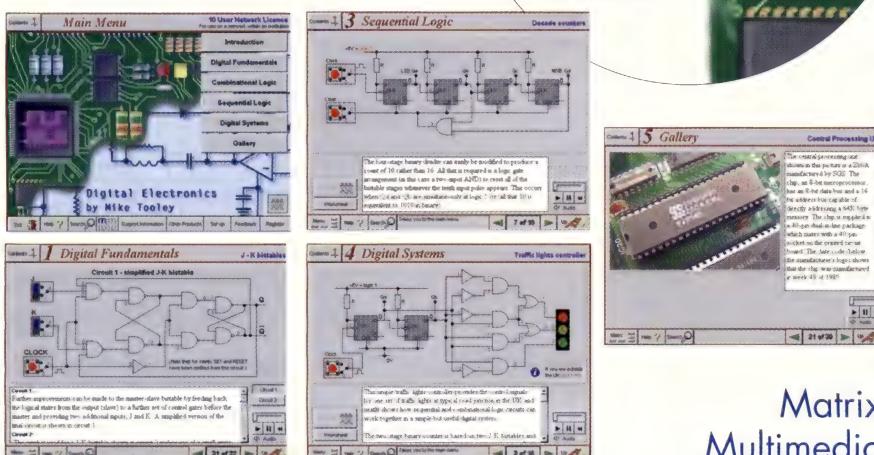
# Multimedia Teaching of Digital Logic



- DMM
- Scope
- Timer
- Counter
- Generator
- Automotive

Matrix Multimedia's DIGITAL ELECTRONICS builds on the knowledge of logic gates covered in Matrix's very popular ELECTRONICS CIRCUITS AND COMPONENTS CD ROM and takes users through the subject of digital electronics, up to the operation and architecture of microprocessors.

The on-screen interactive circuit diagrams can also, at the click of a button, be loaded directly into third party circuit simulators, such as Emona's Electronics WorkBench. These virtual laboratories allow the user to manipulate and test the circuits being studied in greater depth.



Matrix  
Multimedia

# Low Volume PCB Test System

- flying probe with automatic, 3-axis PCB probing operation
- inexpensive means of testing a diverse range of PCBs
- effective in low-volume manufacturing & servicing

- considerable cost saving & time saving over conventional ATE
- no dedicated test fixtures or bed-of-nails adaptors required

Call now, or send the 'QUICK FAX REPLY' form

## Handheld Instrument

# Full Function Autoranging DMM & Scope

The UMM-70, is a multi-instrument, autoranging TRUE RMS digital multimeter with a large multi-line intelligent display and 100kHz oscilloscope.



### DMM Functions

- 3 3/4 digit display • Autoranging
- Measures: DCV, ACV (true RMS), DCA, ACA (true RMS), Ohms, Continuity, dB, Diode, Capacitance, Temperature • Peak Hold • Min/Max/Average

### Scope Functions

- Single Channel: 1.5V to 800V/div
- Bandwidth: 100kHz (1MS/s sample rate)
- Glitch Capture • Pre-trigger & Post-trigger

### Timer Counter/Automotive Functions

- Counter Range: 1MHz • Frequency, Duty Cycle, Period, Pulse Width • Automotive: 0 to 12,000RPM • Adjustable Trigger Level

### Generator

- Signal Out: 10Hz to 20kHz (TTL)

### Operation

- Large 128 x 64 Graphic LCD • On-screen help & warnings • Continuous Auto-Set • RS-232 Interface • Ni-Cd or Alkaline battery operation

WENS Precision



## EPROM Programmer

# Advanced, Handheld & Battery Operated Programmer



P301  
**\$1,264**  
\$1,495 Incl. Tax

The **P301** is STAG's latest, hand-held EPROM programmer utilising high speed, low power, state-of-the-art technology.

Device support includes EPROMs, EEPROMs, FLASH, CMOS PROMs, Serial EEPROMs to 8Mbit. Devices are of course programmed to manufacturers' certified specifications with device upgrades via serial port, into flash memory.

Apart from mains or battery stand-alone operation, the STAG **P301** can also be controlled remotely via PC through a high speed 115.2K RS-232 port. Windows and DOS applications software is supplied.

## Stag Programmers

## Analog Oscilloscopes

# 20MHz & 50MHz Oscilloscopes

The GW Instruments GOS-600G-Series modern, conventional analog scopes provide efficiency, accuracy, performance and proven reliability.



GOS-620  
**\$609**  
\$730 Incl. Tax

The two popular models are the:

- **GOS-620** a most affordable though full featured 2 channel, 20MHz scope
- **GOS-658G** an advanced design 2 channel 50MHz scope with CRT readout and cursors for on-screen measurements.

## GW Instruments

## TekBench

# 60 & 100 MHz Scopes with Spectrum Capability from just \$1,550\* ex-tax

Tektronix' TDS-200 Series scopes are affordable, compact, general purpose digital storage scopes that offer excellent, timesaving signal display facilities.



These extraordinary scopes offer a high **1GS/s real-time digitising rate** plus a very rapid screen update, resulting in a digital scope with display response of an analog scope, at an analog scope price.

And now, there is a new low cost FFT spectrum analyser display option!

The TDS-200's traditional front panel

layout is designed to make waveform capture and measurement quick and easy.

Screen displays can also be downloaded to a PC using the TDS-200's optional serial/parallel/GP-IB interface, **TDS2CM**.

**2 models:** **TDS210:** 60MHz at \$1550 ex-tax & **TDS220:** 100MHz at \$2395; ex-tax

## TDS-200 Series Overview -

- **2 Channels** plus viewable Ext. Trigger
- **1GS/s Real-time sampling/channel**
- **Full Dual Timebase** with zoom
- **Auto Setup:** one button autoranging
- **Cursor Measurements**
- **Automatic Measurements:** Frequency - Period - Cycle RMS - Mean - Pk - Pk
- **Reference Waveform Memories**
- **Bright, Fast Response, LCD Display**
- **\*Optional:** Spectrum module & RS-232/Parallel/GP-IB interfaces not included.

**Tektronix**

## TekScope

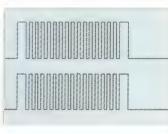
# Handheld Storage Scopes to 200MHz

Tektronix THS700-Series TekScopes combines a full featured Digital Real Time oscilloscopes with a True RMS digital multimeter and data logger, in a rugged, affordable, battery operated instrument.

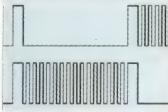
## Why You Need One ADC per Channel

An easy test for a scope: connect both input channels to the same test point and try capturing a repetitive or even better, a single shot event.

The diagrams below illustrate the difference between scopes with a time-shared digitiser or dual ADCs.



Scope with  
Dual Digitisers: both  
channels tied to a single  
test point: reliable display.



Scope with  
1 Digitiser: both channels  
tied to a single test point:  
unreliable display!



## Four handheld TekScopes to choose from . . . . .

- |  |  |  |   |
|--|--|--|---|
| • <b>60MHz</b><br><b>THS-710A</b><br>True 60MHz<br>single shot<br>bandwidth.<br>Dual ISOLATED,<br>independent<br>channels. | • <b>100MHz</b><br><b>THS-720A</b><br>True 100MHz<br>single shot<br>bandwidth.<br>Dual ISOLATED,<br>independent<br>channels. | • <b>200MHz</b><br><b>THS-730A</b><br>True 200MHz<br>single shot<br>bandwidth.<br>Dual ISOLATED,<br>independent<br>channels. | • <b>100MHz</b><br><b>THS-720P</b><br>True 100MHz<br>single shot, dual<br>channel scope<br>for <b>electrical<br/>power<br/>applications</b> . |
|--|--|--|---|

**Tektronix**

# Tektronix

## The best in Scopes ...

## Now the best in DMMs



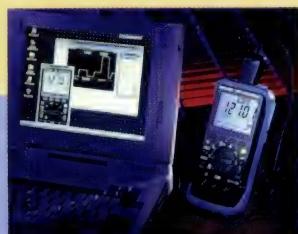
MADE IN U.S.A.

Now you can have it all: features, accuracy, and durability. The TX3 True RMS digital multimeter gives you an extra large numeric display so you get more information in fewer steps - information you can see from across the room! The simplified user interface lets you set up measurements very quickly. And you can view both AC and DC values without changing functions. TX-DMM™ technology delivers accurate, high-resolution measurements, as well as a wide measurements range and an almost instantaneous AC+DC True RMS settling time.

### Just Compare\* -

Features	Tektronix™ TX-3	Fluke™ 87 Series III
Digital display		
Resolution - normal	5,000 counts	4,000 counts
high	50,000 counts	20,000 counts
Bar graph	yes	yes
IEC 61010 rating	CAT III-1000V	CAT III-1000V
DCV accuracy	+/- (0.05% + 1)	+/- (0.05% + 1)
max DC resolution	10µV	0.1mV
ACV accuracy	+/- (0.4% + 1)	+/- (0.7% + 2)
True RMS	AC+DC	AC only
dBm	yes	no
Capacitance	yes	yes
4-20mA process range	yes	no
Temperature range	yes	no
PC interface	yes	no

\* Note that the above comparison is indicative only. Please refer to each manufacturer's detailed specifications. Source of Fluke™ 87 Series III information is Fluke™ web site fluke.com as at 8 June 98.



IR port to PC's RS-232 interface for remote access and control from the PC, using WaveStar for Meters™.

### EMONA INSTRUMENTS PTY LTD

NSW Tel (02) 9519 3933

VIC Tel (03) 9889 0427

e-mail testinst@emona.com.au

QLD Tel (07) 3367 1744

WA Tel (08) 9361 4200

Web www.emona.com.au

Tektronix®

Products and company names are trademarks or trade names of their respective companies. E&OE

4 ● Emona News

Call  
Emona  
for.....

- Oscilloscopes
- PC-Based Instruments
- Multimeters
- Clamp Meters
- Generators
- Counters
- Spectrum Analysers
- Power Supplies
- Panel Meters
- Device Programmers
- PCB Faults Locators
- Electronic CAD Software
- PCB Shorts Locators
- Cal Lab Equipment
- Power & Energy Analysers
- Video Pattern Generators
- T & M Cal Services
- Electrical Test
- Electrical & Electronics Teaching Equipment
- Teaching Systems for Flexible Delivery

# PROGRAMMABLE LOGIC

circuitry, in real time and at speed, using a high-speed signal acquisition and control tool. Designs can be debugged and verified without design re-layout, greatly decreasing the design iteration process from several hours per cycle to a few seconds.

## Application Examples

As an example of the ease with which performance-critical functions can be implemented, figure 2 shows the code and resulting logic for an XOR parity tree. This function will operate in 2.0ns internally, and in 6.6ns measured from input pin to output pin in an SX FPGA. As illustrated, this high level of performance is achieved with behavioural HDL - no architecture-specific code has been introduced.

SX is already being adopted in leading-edge, high-performance applications:

- 8b/10b Encoder for 1Gigabit Ethernet router, 125MB/s sustained data throughput. The designer needed to implement an 8b/10b encoder, and was faced with the prospect of using an ASIC to achieve performance; however, the lead times were unacceptable. No other available programmable logic could implement the design at the specified operating frequency
- 66MHz PCI bus arbiter with 50MHz

sustained data rate. The designer required a programmable logic part to carry out PCI bus arbitration functions. He used an A54SX16-2 to meet the specification with  $TSU < 3.0\text{ns}$ ,  $TCO < 6.0\text{ns}$ .

- DS3 to DS2 Bi-Directional Converter for Telecom Line Interface Card. The design had to operate at 52MHz, which required register-to-register timing less than 19.2ns. Significant amounts of combinatorial logic between the registers prevented any other programmable part from meeting the timing specification. However, an A54SX16-1 was able to meet the spec.

This new FPGA architecture combines the performance and functionality of multiple CPLDs and FPGAs into a single field programmable device, at a reduced cost-per-gate. It also enables the designer to realise significant reductions in design costs and time-to-market, while delivering the critical performance requirements for next-generation designs. ●

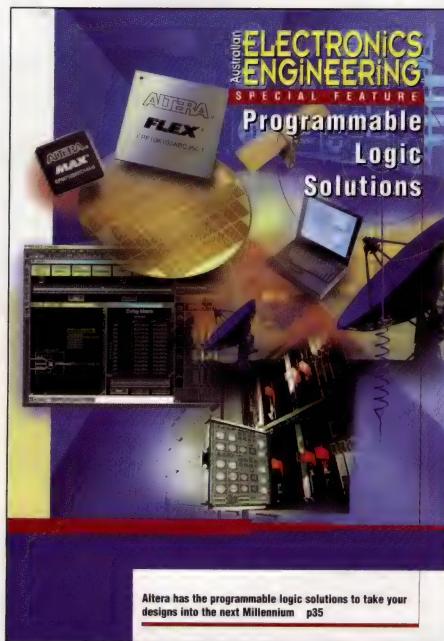
*Ken O'Neill is a product marketing manager with Actel Corporation. Dave Wurthman is a high-level design methodology consultant with Actel. The corporation is represented in Australia by Soanar.*

## Programmable logic solutions

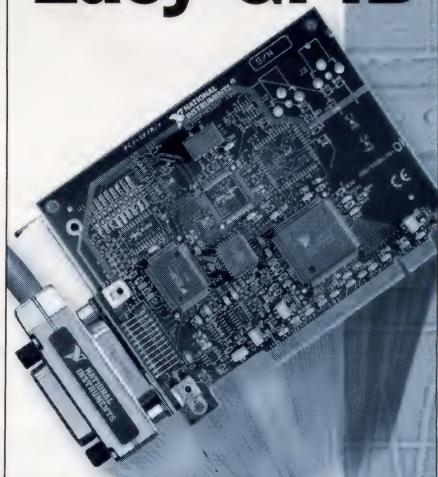
In today's fast moving electronics industry, flexible high-density high-performance programmable logic devices are mandatory to keep up with ever changing standards and reducing time to market. Altera has the broadest range of programmable devices in the industry from in-system programmable devices like the MAX7000A family to reconfigurable CPLDs like the FLEX 10KA family with over 250,000 gates. When it comes to low cost ASIC alternatives no one beats the FLEX6000 family with its revolutionary OptiFLEX architecture optimised for the lowest possible cost. Altera's advanced MAX+PLUS II development tools provide the design engineer a complete architecture independent development environment which enhances your engineers' productivity.

To obtain more information connect to Altera's web page at <http://www.altera.com> or contact Veltek on [arrvel@arwnet.com.au](mailto:arrvel@arwnet.com.au) for more information.

Enquiry number: 1319



# Fast and Easy GPIB



**HS488**

## With Windows 95 and Windows NT!

For reliable, high-performance GPIB solutions, choose a National Instruments IEEE 488.2 controller.

### Maximum Performance with PCI and HS488™

- PCI bus mastering DMA
- Up to 8 Mbytes/s with HS488

### Easy Installation

Get up and running quickly with our Plug and Play GPIB interfaces for Windows NT and Windows 95

### Application Software and Instrument Libraries

- LabVIEW™
- LabWindows™/CVI
- ComponentWorks™ for Visual Basic
- Measure™ for Excel
- C/C++

Call for your FREE application notes



**NATIONAL INSTRUMENTS™**

[www.natinst.com/hs488](http://www.natinst.com/hs488)

(03) 9879 5166

Fax: (03) 9879 6277 • [info.australia@natinst.com](mailto:info.australia@natinst.com)  
[www.natinst.com/australia](http://www.natinst.com/australia)



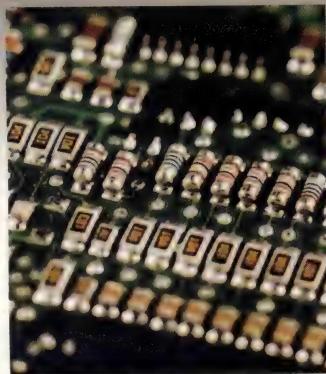
© Copyright 1998 National Instruments Corporation. All rights reserved. Product and company names listed are trademarks or trade names of their respective companies.

Enquiry No. 1322



# You don't have to search the world for resistors and capacitors

*We've done it for you*



We are one of Australia's largest and most experienced passive component specialists, because we searched and found, an extensive range of quality resistors and capacitors that will meet all your requirements.

We stock only the highest quality components supplied by internationally recognised manufacturers, capable of meeting the widest range of specifications, for both consumer and professional applications.

Our dedication to quality and service is underwritten by our ISO 9002 Certification, in addition, we provide comprehensive technical support for our entire product range.

With the biggest variety of components in stock, supported by our immediate service and on-time delivery, we will ensure you meet your production deadlines.

With Crusader; there's no need to search the world, *we've done it for you!*

Please feel free to contact us to discuss your needs in detail.



CRUSADER ELECTRONICS PTY LTD

Sydney: Tel (02) 9792 3922 Fax (02) 9792 1446 Toll Free 1 800 816 733

Melbourne: Tel (03) 9887 9533 Fax (03) 9887 9267 Toll Free 1 800 808 397

Enquiry No. 1323



Quality  
Endorsed  
Company

ISO 9002  
Lic QEC  
1344 SYD

# THE FPGA REVOLUTION

David Schroder looks at the prospects for FPGA technology

Recent advances in programmable logic devices, especially field programmable gate arrays (FPGAs), should be of particular interest to manufacturers of computer and communications equipment. Companies building these products buy approximately two-thirds of all the programmable logic produced today.

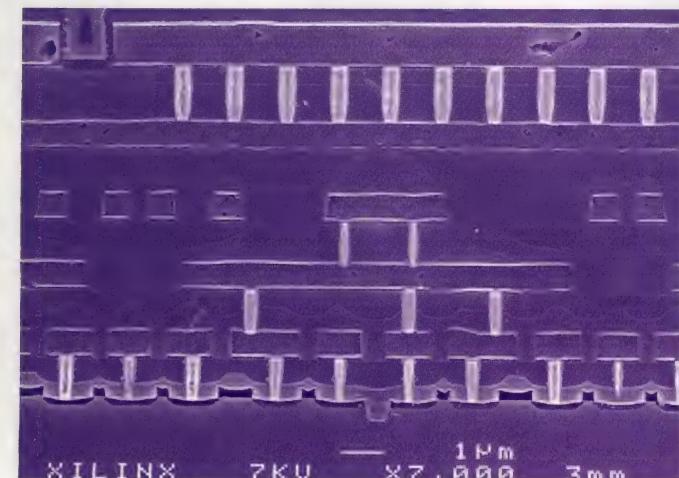
capabilities are especially important — and often key ingredients of success — for businesses that face changing communications and data processing standards, contracting product life cycles and constantly emerging competitors. Such dynamics are making programmable logic an attractive alternative to traditional mask-programmed ASICs for new products such as fixed wireless systems, PCS base stations, telephony line testers, T1 modem banks, and satellite communication systems.

For many designers, programmable logic devices are suddenly beginning to look more like system-level solutions than convenient pieces of "glue logic".

FPGAs with a quarter million system gates are now available. In terms of

logic density, that's an order of magnitude greater than what was available just two years ago. Devices twice as large are expected around mid-year, and it's likely that the first million-gate FPGA device will be sampling by the end of 1998.

Not long ago, 40-50MHz was the norm for FPGAs. Current devices operate at system speeds in the 80-100MHz range, and the next wave of components, slated for delivery this year, will exceed 150MHz. These devices have the performance to support 66 MHz PCI or a 155Mbps synchronous optical network, communications backbones to which wireless and portable equipment will be connected.



An electron microscope view of an XC4000XV chip

On the hardware side, FPGA logic densities and performance are accelerating at a pace never seen before in the industry. State-of-the art manufacturing processes, meanwhile, have driven down costs to the point that FPGAs are now price competitive with gate arrays, especially at low to medium densities below 40,000 system logic gates. At the same time, new software tools and a growing library of intellectual property (IP) for programmable logic are further simplifying and shortening product development times.

Programmable logic, of course, always has offered flexibility and fast time to market for digital designers. But such

## 20 Years of IEEE 488 Solutions!



**HS488**

## A Commitment to Your Success!

National Instruments continues to deliver robust IEEE 488 (GPIB) solutions that leverage the latest industry-leading PC and workstation technologies. Today we have solutions for:

- PCI, PCMCIA, Plug&Play ISA
- Windows NT/Windows 95

### High-Speed GPIB

For high-performance GPIB, choose PCI and HS488 for up to 8 Mybytes/s.

### Instrumentation Software

With Instrument libraries and the leading instrumentation software, LabVIEW™ and LabWindows™/CVI make GPIB programming easy.

### World-Class Technical Support

Our GPIB engineers can help when you need to overcome technical challenges.

Call for a FREE  
**IEEE 488**  
Technical Brochure



**NATIONAL  
INSTRUMENTS™**

[www.natinst.com/hs488](http://www.natinst.com/hs488)

**(03) 9879 5166**

Fax: (03) 9879 6277 • [info.australia@natinst.com](mailto:info.australia@natinst.com)  
[www.natinst.com/australia](http://www.natinst.com/australia)



© Copyright 1998 National Instruments Corporation. All rights reserved. Product and company names listed are trademarks or trade names of their respective companies.

**Enquiry No. 1324**

# Since when did pin locking become so important?

Shy of having someone lob a grenade into your cubicle, the hazards of not having control over pin assignments can be extremely dangerous. Maybe fatal.

Now there's a way to escape those last minute design changes unscathed.

## Introducing the XC9500 CPLD.

### The no-risk ISP Solution from Xilinx.

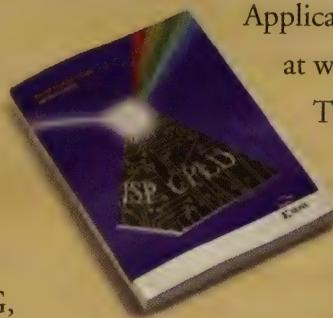
Now you can finish your design without worrying about those inevitable last minute changes. Your pins stay locked and predictable. Each time, every time. That means no PC board rework, no cost overruns and no product slips. The XC9500 is based on our innovative FastFLASH™ technology. And that means guaranteed timing, the industry's most advanced JTAG,

plus densities ranging from 36 to 288 macrocells, each "footprint compatible".

Why not play it safe? Ask for a copy of our ISP

Application Guide. Or visit our website at [www.memecbv.com.au](http://www.memecbv.com.au).

The XC 9500 from Xilinx, when pinlocking really counts.



**PEOPLE  
CHOOSE**

**ACD**

[www.memecbv.com.au](http://www.memecbv.com.au)



**XILINX®**

**MELBOURNE**  
Tel: (61 3) 9760 4250  
Fax: (61 3) 9760 4255

**SYDNEY**  
Tel: (61 2) 9585 5533  
Fax: (61 2) 9585 5534

**ADELAIDE**  
Tel: (61 8) 8364 2844  
Fax: (61 8) 8364 2811

**BRISBANE**  
Tel: (61 7) 3246 5214  
Fax: (61 7) 3275 3662

**PERTH**  
Tel: (61 8) 9472 3232  
Fax: (61 8) 9470 9632

**AUCKLAND**  
Tel: (64 9) 636 0584  
Fax: (64 9) 636 5985

**WELLINGTON**  
Tel: (64 4) 237 9711  
Fax: (64 4) 237 9718

**CHRISTCHURCH**  
Tel: (64 3) 379 3889  
Fax: (64 3) 379 3072

A MEMEC Group Company within VEBA Electronics Inc.

Enquiry No. 1325

FPGAs have become a new home for intellectual property (IP), or cores, those predefined system functions familiar for nearly a decade to designers of custom ASICs. These functions - significant design challenges in themselves — are greatly reducing design time for wireless and portable system designers who opt for programmable logic. Expansive new FPGAs, when coupled with cores, are now being viewed by forward looking designers as true system level building blocks.

Today, FPGAs are an attractive alternative for power-conscious designers of portable equipment. While FPGAs are larger and faster than ever before, they are also rapidly progressing down the power curve. During 1997, for example, the industry saw not just the familiar selection of 5V products, but production versions of new 3.3V FPGAs and the first samples 2.5V FPGAs. It's possible that FPGAs operating at 1.8V will reach the market in 1999.

The domain of FPGAs typically has been for high value, low volume applications, that is, for products manufactured in the tens of thousands, or hundreds of thousands, of units. But that is beginning to change. Component suppliers are finding new ways to reduce manufacturing costs, and they are passing the savings on to customers and targeting new low-cost FPGAs at high volume applications. This year equipment designers can expect to see FPGAs offering 5,000 system logic gates priced for less than \$3.

What's going on here? To a large extent, it's a story about an aggressive adoption of the most up-to-date semiconductor manufacturing processes. In the past, programmable logic suppliers were one to two generations behind the process leaders, which translated to 18 months to two years. But that is no longer the case. Leading semiconductor foundries now are eager to use FPGAs to drive their process development because the regularity of SRAM-based FPGA architectures facilitates defect analysis and fault testing.

With their large transistor counts and their minimum spacing between metal layers, FPGAs are an excellent vehicle to troubleshoot the most up-to-date semiconductor fabrication lines.

For example, the smallest member of the new Xilinx XC4000X family of 0.25 micron, 2.5V, FPGA devices has 25 million transistors on a single piece of silicon. That is more than three times the number of transistors in Intel Corp's Pentium II processor.

The success of deep sub-micron fabrication technology, however, is causing some waves in the world of FPGA design. To take advantage of improvements in device technology, designers must now provide new supply voltages: 3.3V and 2.5V for devices manufactured on 0.35 and 0.25 micron processes, and soon 1.8V for emerging 0.18 micron products. All of this is happening in a compressed space of a few years, and it's in stark contrast to what designers have been used to for the last 30 years, when 5V was the standard supply voltage for digital circuits.

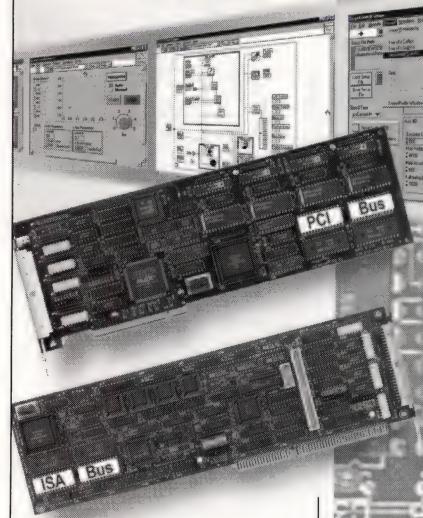
Designers who want to take advantage of the technical and economic benefits of smaller process geometries face several new issues, among them how to generate and distribute multiple supply voltages on circuit board, how to interface between devices with different supply voltages, and how to cope with supply voltage sequencing. Component suppliers are working to make this transition as smooth as possible through innovative product designs.

Accompanying the rapid pace of change in programmable logic device technology has been a parallel development of software cores, which only recently have begun to make inroads into PLD designs. A number of reasons account for this new migration.

First, programmable logic devices, as already noted, are now large enough to accommodate cores. This has prompted component suppliers and independent IP developers to create cores that target programmable logic devices. These pre-defined and verified cores range from PCI and PCMCIA bus interfaces to digital signal processing (DSP) functions such as finite impulse response (FIR) filters and Fast Fourier Transforms (FFTs). They also include standard peripheral controllers; asynchronous transfer mode (ATM) functions and complete reduced instruction set computer (RISC) processors. Cores for Reed Solomon and Viterbi encoders and decoders, which are frequently used

To a large extent, it's a story about an aggressive adoption of the most up-to-date semiconductor manufacturing processes.

## PC-Based Motion Control



*Get complete, easy-to-use solutions for motion control — now from the industry's leading data acquisition vendor.*

- FlexMotion™ high-performance servo and stepper controllers
- ValueMotion™ general-purpose servo and stepper controllers
- nuDrive™ power amplifier subsystems
- Universal Motion Interface™ connectivity modules
- Software for quick application development
- Advanced application virtual instruments and examples for LabVIEW™ and BridgeVIEW™
  - Dynamic link libraries for Visual Basic and LabWindows™/CVI
  - C Libraries
  - Free, ready-to-run motion control software
  - For Windows NT/95/3.1 and Mac OS
  - ISA and PCI

*Call today for data sheets*

**(03) 9879 5166**

[www.natinst.com/daq/](http://www.natinst.com/daq/)  
[www.natinst.com/australia/](http://www.natinst.com/australia/)



**NATIONAL INSTRUMENTS™**  
The Software is the Instrument™

**National Instruments Australia**

P.O. Box 466  
Ringwood, VIC 3134  
Tel: (03) 9879 5166  
Fax: (03) 9879 6277  
[info.australia@natinst.com](mailto:info.australia@natinst.com)  
[www.natinst.com/australia/](http://www.natinst.com/australia/)



© Copyright 1998 National Instruments Corporation. All rights reserved. Product and company names listed are trademarks or trade names of their respective companies.

**Enquiry No. 1326**

# RS lets the cat out of the bag ...



Right now our prices  
are better than ever  
despite the plight of  
the Ozzie dollar.

While others have been  
forced to increase prices,  
ours remain fixed.

- More than 63,000 electronic, electrical & industrial products
- Free 2,000 page Catalogue
- Free Catalogue on CD-ROM
- Same day delivery
- Call & Collect Trade Counters
- Easy 1300 Orderlines
- Technical Helpline
- Repair & Calibration



RS Components Pty Limited  
ADELAIDE-BRISBANE-  
MELBOURNE-PERTH-SYDNEY  
Tel: 1300 656 636  
Fax: 1300 656 696

Enquiry No. 1327

## FEATURE

for error rate calculations in cellular systems, have just reached the market for FPGAs.

The great attraction of cores is that they allow designers to create the most difficult sections of their designs quickly. For small designs, cores are a welcome convenience; for larger, very complex circuits, they are becoming a necessity. With devices becoming so large, it's impossible to imagine meeting a market window by designing one gate at a time. In fact, some designers are incorporating multiple cores into a single device.

Moreover, new tools are on the horizon for 1998 that will make the task of grouping multiple cores on a single PLD device even easier for designers.

Intellectual property developers have traditionally built their cores around standard high level description languages such as VHDL and Verilog, the mainstream tools of ASIC designers that provide a large degree of flexibility. These languages are now becoming the basis for an increasing number of programmable logic tools, and that is one of the many things attracting IP developers to the programmable logic market.

In fact, developers are discovering that FPGAs are excellent prototyping vehicles for cores. Developers can silicon-test their designs directly on programmable logic devices and polish the code much quicker and inexpensively than they could by going through an ASIC vendor and lining up a customer as a development partner. That's because SRAM-based PLDs permit designers to "rewire" the devices immediately by reprogramming them with new designs.

Also, the growing use of PLDs presents independent IP developers, and programmable logic vendors themselves, with a relative "mass market" for their products. Programmable logic customers number in the tens of thousands, compared to a few hundred very large companies that buy IP for their high volume mask-programmed ASICs.

Cores also are helping PLD designers answer the classic make or buy question. Take the PCI interface, for example, the popular bus that's become commonplace in data processing, communications and instrumentation equipment. As ubiquitous as it is today, the PCI interface remains a complex standard rife with timing-critical specifications. "Making" the PCI interface from scratch can add from six to nine engineering months to a design. "Buying," on the other hand, can mean a substantial saving of time and money, especially for PCI designs where engineering time, cost and volume may not justify going to a traditional ASIC solution. Additionally, buying IP frees designers to concentrate on the

intellectual value they add - beyond the basic PCI bus interface - to the product that's on the drawing board.

The Xilinx LogiCORE PCI interface illustrates one model of how cores are being delivered for the programmable logic market today. It consists of pre-defined cores (target and initiator) that allow designers to create a complete PCI interface — customised for their particular application without jeopardising functionality - on a single FPGA and still have ample logic left over on the same chip to create the unique back-end interface logic required for their application.

Two points illustrate why the market has quickly accepted such products like. First, the design is pre-verified and tested, ensuring that it will comply with the rigorous PCI specification. Second, it is a firm core that is optimised for a particular FPGA architecture. Timing for critical paths is fixed, ensuring predictable and consistent performance.

A broader source of cores is emanating from the growing community of independent IP developers. While IP vendors may support multiple product lines from various programmable logic vendors, they are coming to realise that their cores must be tuned for a particular device architecture when maximum performance is required. Power consumption, performance and predictability of the cores that result will vary considerably based on differences in an individual PLD vendor's place and route tools, device interconnect and on chip memory structures.

It is inevitable that design verification and device optimisation will become critical elements for the success of PLD cores, whether they are sold and supported by device suppliers or by IP developers. In fact, independent IP developers are beginning to align themselves closely with programmable logic vendors in order to accomplish just this. Such partnerships help to ensure that cores will reach the customer only after they are verified and optimised and only when a strong support system is in place.

A new momentum is clearly behind programmable logic devices and cores developed specifically for them. During 1998, designers of portable and wireless products can expect to see significant new developments that will make their jobs easier. Larger and faster devices, new FPGA architectures, powerful tools and targeted IP offerings are shaping up to combine cores and programmable logic into true system level solutions.

*David Schroder is a product manager with ACD in Melbourne. Tel: (03)-9760-4250*

<http://www.morris.com.au>

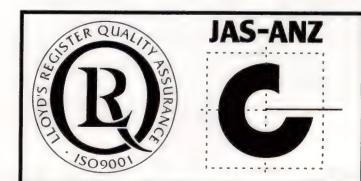
means

**PRINTED CIRCUIT BOARDS**



A DIVISION OF MORRIS PRODUCTIONS PTY. LTD.  
A.C.N.: 000 328 218

Sydney      Ph: (02) **9789 6200**  
Melbourne    Ph: (03) **9872 4900**



Fax: (02) **9787 2529**  
Fax: (03) **9872 4914**

... and puts  
it among  
the  
pigeons



Fixed prices at RS  
means fixed prices.  
So why pay more than  
you have to in this  
tough economic  
climate?

- More than 63,000 electronic, electrical & industrial products
- Free 2,000 page Catalogue
- Free Catalogue on CD-ROM
- Same day delivery
- Call & Collect Trade Counters
- Easy 1300 Orderlines
- Technical Helpline
- Repair & Calibration



RS Components Pty Limited  
ADELAIDE-BRISBANE-  
MELBOURNE-PERTH-SYDNEY  
Tel: 1300 656 636  
Fax: 1300 656 696

Enquiry No. 1329

## EMC

# EMC — FACING THE CHALLENGE

Ian Graham and Graham Callander describe the challenge of EMC.

The explosion in the number of electronic products in service today means that the potential for interference between them is growing at an ever increasing rate. In practice such interference is largely prevented by government legislation regulating what is known as Electro Magnetic Compatibility (EMC). This legislation is becoming ever more stringent, and any new product that fails to comply with the EMC regulations cannot legally be sold.

It is now essential that design for EMC now forms an 'up front' part of the system design philosophy, for any new electronic product. Good EMC practice costs little to implement at the outset of

EMI can either be transmitted or received in a radiated form, or may be conducted between separate areas of circuitry by means of connecting cables. The level of EMI produced by an electronic product is covered by the general term 'Emissions', and the tendency of the product to receive EMI is known as its 'Susceptibility'. It should be noted that the 'Law of Reciprocity' applies directly, thus a system designed to minimise emissions will also be the least susceptible to external EMI.

### Radiated Emissions

Close attention to layout is the first line of defence in designing for EMC. The requirements of sanitary layout can be summarised in some basic laws of physics, such as Ohm's Law, Kirchhoff's Law, Faraday's Laws and Lenz's Law.

Essentially all of these point to the fact that low speed, low current circuits can be fabricated using the node

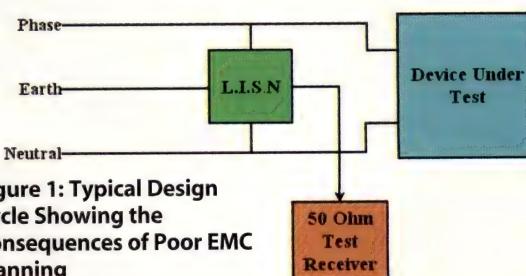


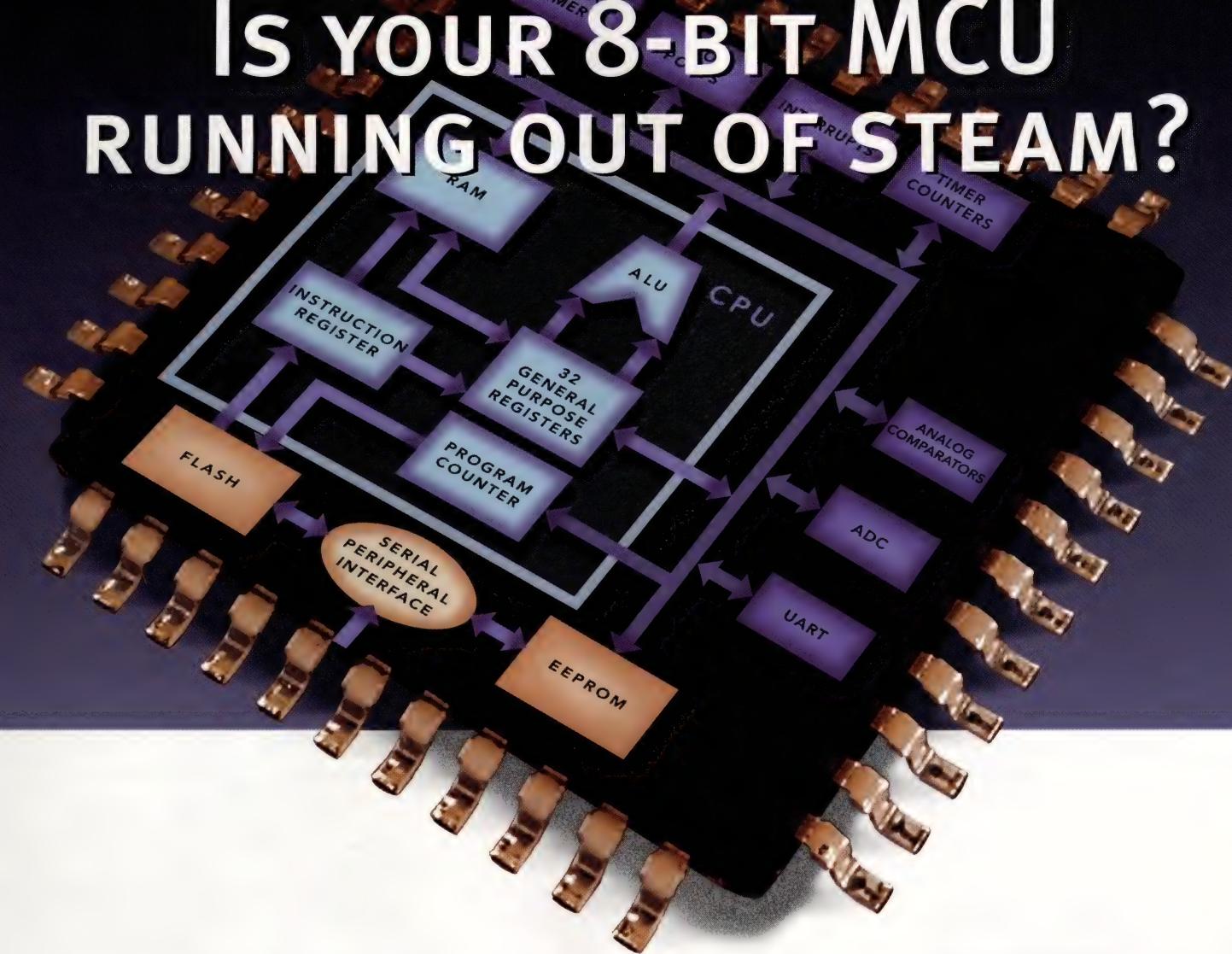
Figure 1: Typical Design Cycle Showing the Consequences of Poor EMC Planning

a product's development, but poor planning often leads to lengthy and expensive re-design at the Type Approval phase. Depending on the severity of any EMC related non-compliance experienced, this can literally be a case of 'start again', as shown in figure 1.

Successful negotiation of the EMC hurdle requires that the mechanisms for generation and reception of Electro Magnetic Interference (EMI) be minimised by design.

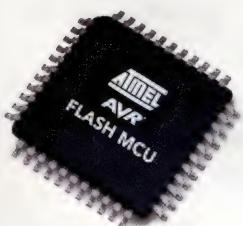
approach. In other words, the components can simply be wired together according to the circuit schematic, with any two points in the circuit connected together by conductors being assumed to be at the same potential. This approach does NOT work where high frequencies or high currents are present because the conductors making the connections between components can no longer be considered pure short circuits, as assumed by the node approach. The above laws remind

# IS YOUR 8-BIT MCU RUNNING OUT OF STEAM?



The extraordinary throughput of Atmel's AVR MCU gives you the freedom to go where no other 8-bit MCU has gone before.

It just made sense to us. Give engineers a high-level language so they can write code quickly. Make it low power so they have the ability to extend battery life and enhance reliability. Plus include in-system programmable Flash for virtually instant product upgrades and lower inventory costs. Atmel offers the broadest selection of Flash-based microcontrollers in the industry.



Get to market faster with Atmel's AVR Flash MCUs.

We are a leader in nonvolatile memory, and have shipped over 34 billion Flash devices!

Product Number	Flash (bytes)	SRAM (bytes)	EEPROM (bytes)	ISP Port	UART	Vcc	Op. Freq. (MHz)	Counter/Timers	Pin Count
AT90S1200	1K	0	64	Yes	No	2.7-6.0	0-12	1	20
AT90S2313	2K	128	128	Yes	Yes	2.7-6.0	0-10	2	20
AT90S4414	4K	256	256	Yes	Yes	2.7-6.0	0-8	2	40/44
AT90S8515	8K	512	512	Yes	Yes	2.7-6.0	0-8	2	40/44

Contact Insight Electronics on (03) 9760 4277 or [www.memecbv.com.au](http://www.memecbv.com.au) for more information, or e-mail: [info.insight@memecbv.com.au](mailto:info.insight@memecbv.com.au)



# RS Top cat



Add red-hot prices to our reputation for reliability, quality and speed and you'll soon appreciate the *real* meaning of value.

**Call RS now!!  
1300 656 636**

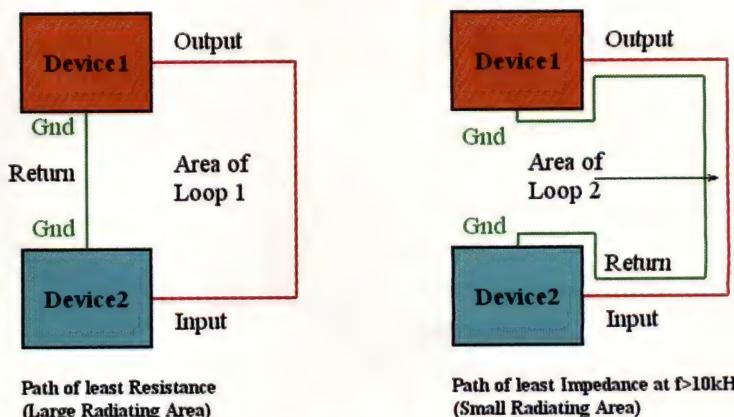
- More than 63,000 electronic, electrical & industrial products
- Free 2,000 page Catalogue
- Free Catalogue on CD-ROM
- Same day delivery
- Call & Collect Trade Counters
- Easy 1300 Orderlines
- Technical Helpline
- Repair & Calibration



**RS Components Pty Limited**  
ADELAIDE-BRISBANE  
MELBOURNE-PERTH-SYDNEY  
Tel: 1300 656 636  
Fax: 1300 656 696

**Enquiry No. 1331**

## EMC



**Figure 2: Minimising radiated EMI by layout**

us that any conductor will have resistance, self-inductance, self-capacitance, as well as mutual inductance and capacitance to all adjacent conductors. All these properties will affect EMC (not to mention the circuit operation) and must be considered when designing the layout of such systems. This is not an application for your autorouter!

According to Kirchhoff's Laws, each circuit can be analysed into what are known as 'Current Loops'. A particular current loop may, for example, be formed by the power supply, the track-work from the power supply to an active device (amplifier), the load, and the track-work back to the power supply. As any current loop may be treated as a radiator, layout considerations demand that this entire loop be kept as short as possible and have the absolute minimum cross sectional area in order to minimise the level of the radiation emitted. This concept is illustrated in figure 2.

The importance of this can be readily appreciated, given that the magnetic coupling between loops is considerably more interactive than capacitive coupling between conductors. An effective technique for minimising loop area is to overlay signal and return and power supply tracks on adjacent layers of the PCB.

Problems associated with current loops can also arise when heatsinking semiconductor power devices where the tab of the device is live. Given that an insulator is now required to isolate the tab from the grounded heatsink, a capacitor is formed by the tab/insulator/heatsink arrangement. If the power device dV/dt is high, then a current loop is formed via the tab, insulator, heatsink, ground, and back through other circuit components to the tab. This loop can easily have a large area and become a highly effective radiator. In practice the actual radiation may be reduced if the heatsink is left ungrounded and allowed to float.

Where adequate layout considerations

have been applied, the need for shielding may be reduced. However, as circuit densities increase it becomes progressively more difficult to accommodate the layout rules rigorously throughout, meaning that some undesirable current loops are inevitably present. This is especially true where high speed or RF circuits are considered, and so the need for shielding in such circuits is rarely avoidable as it provides a means for containing the radiation produced within an area of a PCB to that area alone. This in turn has a major bearing on the functional reliability achieved by the product, as well as being fundamental to it gaining the mandatory EMC certification.

## Conducted Emissions

External wiring, either between PCBs, subsystems, or the outside world must be regarded intimately as part of the system, as it has the potential to completely alter the behaviour of a circuit by introducing unwanted currents. For example, where cabling connects two opposite sides of a PCB, externally generated currents may flow in common earth tracks.

Testing for conducted emissions generally applies only for frequencies up to around 30MHz. Below this frequency, testing for radiated emissions can often be omitted because the radiation would simply be in direct proportion to the cable currents measured during the conducted emissions testing.

For mains powered equipment, the device under test is powered via a Line Impedance Stabilisation Network (LISN). This provides a precise impedance across which the RF voltage may not exceed prescribed levels throughout the swept frequency range and is connected as shown in figure 3.

In cases where it is required to test conducted emissions above 30MHz, a special filter/coupling device which can

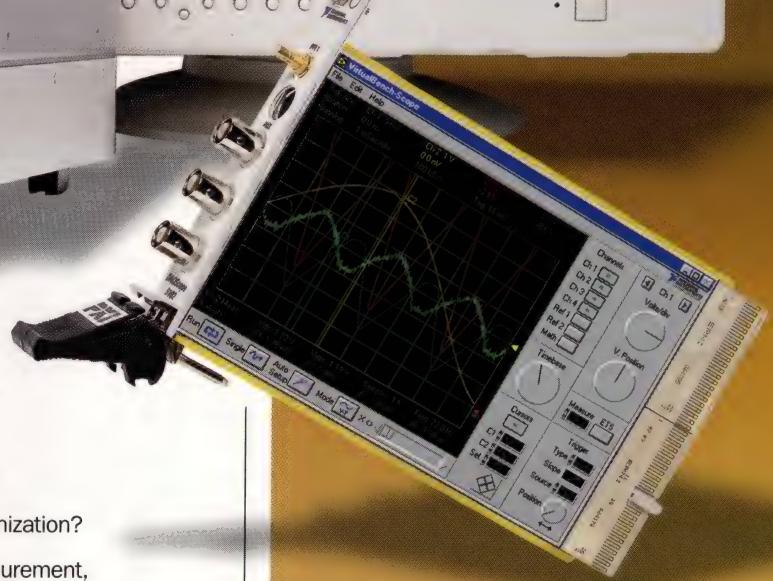
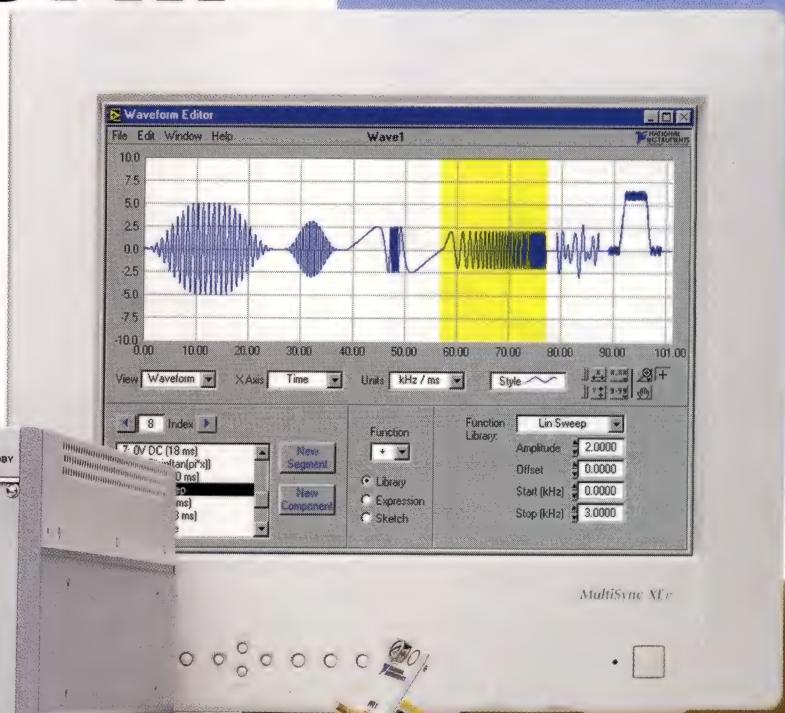
# The NEW PC Platform for Measurement and Automation

PXI™

Modular  
Instrumentation



- ✓ Portable
- ✓ Benchtop
- ✓ Rackmount



**A**re you looking for a more cost-effective platform?

Something that blends standard Windows software and high-speed PCI with rugged industrial packaging and built-in timing and synchronization? Would you benefit from a plug and play data acquisition, test, measurement, and industrial computing solution that's affordable and easy to use? We have something that we're sure you'll agree – just makes sense.

PXI Modular Instrumentation –

**The new platform for measurement and automation.**



**Call today for a FREE  
copy of the "PXI Modular  
Instrumentation" Brochure  
(03) 9879 5166**



**NATIONAL  
INSTRUMENTS™**  
*The Software is the Instrument™*

**National Instruments Australia**

P.O. Box 466 • Ringwood, VIC 3134

Tel: (03) 9879 5166 • Fax: (03) 9879 6277

info.australia@natinst.com • www.natinst.com/australia/

© Copyright 1997 National Instruments Corporation. All rights reserved.  
Product and company names listed are trademarks or trade names of their respective companies.

**Enquiry No. 1332**

# Test the difference



Australia's independent complete testing solution

Gain the advantages of Australia's leading testing facilities.

The combined strengths of Comtest Laboratories and EMC Technologies offer you an unmatched international level of expertise, state-of-the-art test facilities plus services including:

- ACA testing (PABX, ISDN and CE)
- Electromagnetic Compatibility
- Anechoic Chamber for EMC testing
- Safety/Low Voltage Directive
- Precompliance
- Compliance Folder Management
- Competent Body Services
- Certification Body
- Telecommunications Equipment
- Military/Aerospace/Automotive
- Medical/Appliances/Lighting

Test the best and discover the difference.

**Call Comtest or EMC today,  
your partners in Approvals.**



**EMC Technologies Pty Ltd:**  
Ph: 03 9335 3333 Fax: 03 9338 9260  
<http://www.emctech.com.au>

**Comtest Laboratories Pty Ltd:**  
Ph: 03 9645 5933 Fax: 03 9645 5944  
<http://www.comtest.com.au>



COM2346

Enquiry No. 1331

## EMC

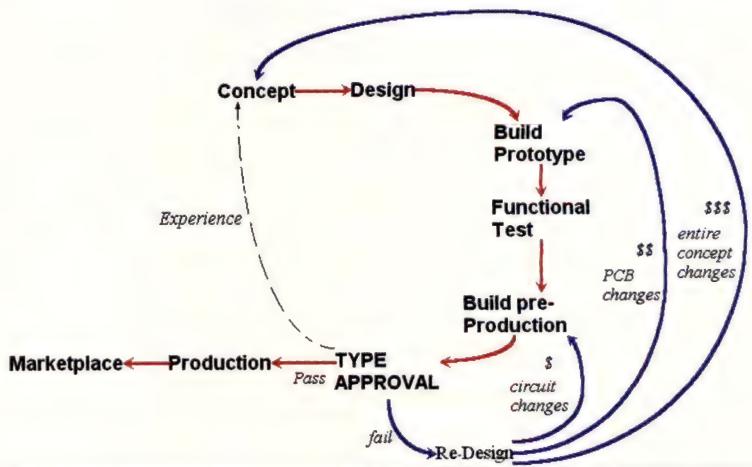


Figure 3: Use of a LISN during conducted emissions testing

be moved along the input and output leads is used to find the point where the standing waves reach their maximum energy.

One very effective approach to dealing with conducted emissions, and their directly related radiating counterparts, is to model active devices within the unit as RF transmitters. The input and output leads (or input leads and the case) of any particular device can be treated as a dipole, and so the aim is simply to reduce the coupling from the transmitter to this dipole. In practice this can be achieved through basic layout precautions and by increasing the impedance of the transmitter with series inductors and suitable decoupling capacitors to ground. The physical relationship of the input and output wiring is fundamental as is the differential and common mode rejection characteristics of the inductors. An upper limit for the mains input capacitors is set by maximum allowable 50/60Hz current flowing in the mains earth line to typically 4.7nF.

## Earthing

Earthing is a major consideration when considering the management of EMI, as all potentials are relative. There is no such thing as a true ground; 'Mother Earth' is assigned a potential of zero by convention and convenience only. For example, mains earth is only there for 50Hz fault current protection; the actual earth is many millihenries and milliohms away back through some unspecified mains power wiring.

In general though, some point must be designated as 'ground' for each subsystem present, with connections that must be common being treated so that they do in fact see a common 'ground'.

It would be possible to write an entire

volume on good earthing practice, as an understanding of this subject is so essential to design for low EMI. In fact, it would be fair to say that design for low EMI in high speed (or RF) systems requires a complete reversal of common PCB layout practices whereby the circuitry is laid out first. In such cases, any remaining (randomly distributed) areas of PCB not occupied by circuitry tend, by default, to become the only available 'earth'. Instead, it is paramount to get into a mindset where the earth areas are the first to be allocated on the PCB 'floor plan', with the digital and analogue/RF circuitry then being laid out 'from the ground up'.

## Conclusion

The material presented highlights the fact that EMC is a legal requirement, the design for which is becoming ever more challenging given the crowded modern day RF spectrum and the increasing operating speed of electronic circuitry. In order to minimise development costs and time to market, it is essential that this often obscure design requirement is afforded at least as much attention as the more obvious parameters right from the outset.

*Ian Graham and Graham Callander are with Avnet Design Services (email: [design@avnet-pacific.com](mailto:design@avnet-pacific.com); web: [www.avnet-pacific.com](http://www.avnet-pacific.com); tel: +64-3-366-0191; fax: +64-3-366-3911).*

**For more information on any of the products or advertisements in this issue, visit the AEE website [www.aee.com.au](http://www.aee.com.au)**



## Safe, secure and dependable ...

We solve your interconnection problems: timely, effectively and ongoing...

- **Coaxial Connectors, Cable and Assemblies** matched cables and connectors
- **Lightning Protectors (EMP)** in-line coaxial protection for applications to 12 GHz
- **Antennas and Strategic Cell Extensions, Microcell Technology**  
for indoor and outdoor use (GSM, DECT, PCS, PCN, DCS 1800 MHz)
- **Filters and Filter Sub-systems**



**HUBER+SUHNER**  
(AUSTRALIA) PTY LIMITED

**SYDNEY**  
42 Wattle Road  
PO Box 976  
Brookvale NSW 2100  
Tel: (02) 9905 0000  
Fax: (02) 9905 6378

**MELBOURNE**  
16 Kitchen Road  
Dandenong  
PO Box 420  
Doveton VIC 3175  
Tel: (03) 9706 9872  
Fax: (03) 9706 9877

**BRISBANE**  
7/2902 Logan Road  
Underwood  
PO Box 31  
Underwood QLD 4119  
Tel: (07) 3841 6077  
Fax: (07) 3841 9397

# NURTURING DEVELOPMENT

When NEC Australia launched its fully automated state-of-the-art surface mount line for electronic components in August of last year, the goal was to use the additional capacity to expand the company's contract manufacturing business.

The \$4 million facility instantly doubled the company's loading capacity to eleven and a half million components a week and gave customers new options, such as the placing of larger or odd-shaped components as well as the implementation of pin-through reflow technology.

Considering the Melbourne-based company's history in all aspects of manufacturing, its push in the potentially lucrative business of contract manufacturing was to be expected. But for Tony Carney, NEC's manager for contract manufacturing, directing expansion has proven challenging.

"Companies shopping for a contract manufacturer are looking for more than an outsourcing arrangement. They are looking for a partnership", he says. "They want to know the manufacturer will take their product on board and nurture its development."

Carney says one of the biggest advantages NEC has is location. Its facility is in Australia. "It is understandable that customers feel insecure when their products go offshore", he says. "Partnership with us means local manufacturing and local consultation and this is important for companies that are committed to Australia and the growth of our industry".

It doesn't mean suffering second best.

NEC's \$4 million surface mount line has doubled the company's loading capacity.

Carney says: "We can offer our customers the most competitive pricing and lead times for components through our network of international purchasing offices and we also offer assistance in design for manufacture and all other aspects of introducing a new product."

The line has received ISO9001, ISO14001 and BABT accreditation. It is also a recipient of the Australia Quality Award and has undergone extensive audits by customers.

The heart of any surface mount process is the solder printer, and the line is equipped with an MPM AP27. It features statistical process control, 2D and 3D inspection, as well as automatic paste application and stencil cleaning. The placement machines are a Panasert MV2F, which is capable of placing up to 36,000 components per hour, and a Panasert MPAPV fine pitch precision placer for positioning components down to 0.3mm pitch. Gluing, if required, comes by way of a Panasert HDP3 high-speed multi-head dispenser.

Steve Wadeson is NEC's production engineering manager in charge of the development and implementation of the line. He is particularly proud of a unique

robot, employed to place odd-shaped parts, both electronic and mechanical.

"The robot has fairly simple tooling, but has a very accurate component placement system. This means we can produce tools for odd-shaped parts quickly and cheaply, and place those parts with a very high degree of accuracy", he says. The robot can also supply the force to snap parts into place if required.

In September last year the Swedish concern Combitech awarded NEC a \$15 million contract to produce 600,000 electronic tags for the CityLink system in metropolitan Melbourne. Daniel Ljunggren, Combitech's project manager, says NEC Australia was selected from seven competitors first and foremost because of price. However he says the overall package they were offered played a decisive role.

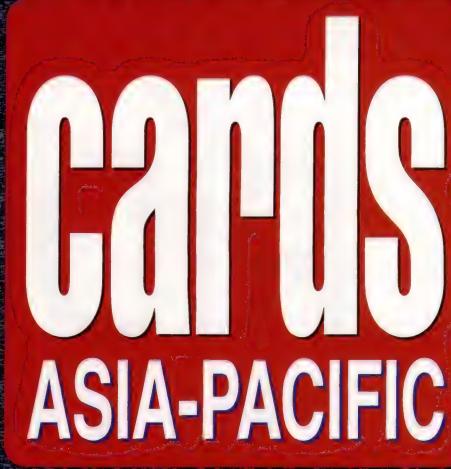
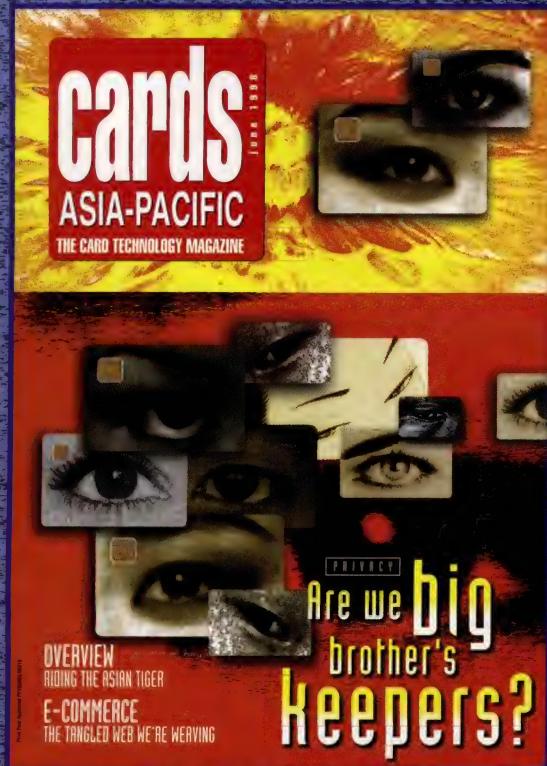
"Our first impressions of the facilities and the staff at Mulgrave were very favourable and these impressions have been born out by the excellent working relationship we have established," he says.

According to Ljunggren, Combitech was looking for a long term relationship to maximise the considerable investment they have made in the electronic tag project. "Although price was paramount, the partnership side was a key issue in choosing NEC," he says, "and the option of using NEC's huge worldwide purchasing and manufacturing network very attractive".

Asked for how to advise others looking for a contract manufacturer, Ljunggren suggests customers explore all the skills and abilities the manufacturer is offering.



# Need to know what's going on?



Cards Asia-Pacific is the authority on card technologies in the Asia-Pacific rim. The magazine takes into account not only smart cards but also all other card technologies available. Its aim is to bring the card industry relevant, topical and accurate news and information on development and research, market trends, analyses and opportunities, new products, view and events. It also links up with all the major exhibitions and conferences in Australia, New Zealand and Asia.

## YES! I would like to subscribe to CARDS ASIA-PACIFIC

Mr/Ms/Mrs: \_\_\_\_\_ First Name \_\_\_\_\_ Last Name \_\_\_\_\_

Job Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

Suburb: \_\_\_\_\_ State: \_\_\_\_\_

Pcode: \_\_\_\_\_ Country: \_\_\_\_\_

Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_

Email: \_\_\_\_\_

Please tick here if you do not wish us to pass your details to other companies for direct mail promotions.

**Australia**  A\$30 for 1 year,  A\$48 for 2 years.

**Overseas**  US\$35 for 1 year,  US\$55 for 2 years.

By cheque  money order  or charge my:  B/card

Amex  Diners  Mastercard  Visa

CARD no:

Cardholder's name: \_\_\_\_\_

Expiry date: \_\_\_\_\_ Signature: \_\_\_\_\_

### PLEASE TICK THE INDUSTRY YOU ARE IN:

- End Users
- Card Manufacturers
- Service Providers and Vendors
- Systems Providers
- Other \_\_\_\_\_
- Software and Biometrics
- Sub Assembly Suppliers
- Chip Suppliers
- Raw Material Supplier

**Fax To:** +61 2 9422 2977

**Phone:** +61 2 9422 2858

**Mail To:** Cards Asia-Pacific  
Locked Bag 2999,  
Chatswood Delivery Centre, NSW 2067,  
Australia

**Email:** subscription.cap@reedbusiness.com.au

# RIDING OUT THE CRISIS

**K**iwis were catching their breath after absorbing the fact that their current account deficit had climbed to 7% of GDP when the yen started free falling, dragging their dollar down to under 50cents US for the first time in 12 years.

It's been bad news for consumers and importers, but a collective sigh of relief from embattled electronics exporters who've coped for years with an overvalued Kiwi dollar.

It's been scary stuff, with a speech from the Reserve Bank Governor Don Brash at the London Guildhall providing few answers to a lowered fiscal surplus and the developed world's worst net foreign debt relative to GDP. The credit rating agencies have foreshadowed a re-rating downwards of the foreign currency debts. Lower commodity prices are feeding back into a drop in price of rural land. House sales in Auckland in May were 30% down on the previous year.

This has occurred in the short space of six to eight months as the fiscal surplus was eroded by the Coalition Government's big spending plans for health and education and the Japanese yen started to haul the country on the path toward a devalued currency. The current Government under the proportional representation system is an uneasy mix of dry conservative, fiscally responsible economic rationalists — the National Party and the tariff-loving anti-immigrant public-spending New Zealand First Party who have seen their support drop from 17% at the polls to statistical insignificance.

The National Party has recovered from a disastrous slump to about 38% and the Opposition Labour Party is at the same level. The Prime Minister's



Gordon Ferrier

response to the falling dollar has been that the market will provide the adjustment mechanism of higher interest levels and that Government intervention would be a costly failure, pointing to the Australian Reserve Bank supporting the Aussie dollar for no discernible benefit. The Labour opposition has not ventured an answer to the plight except to parade Robert Reich, the former Secretary of Labour in the US as a promoter of the third way: Responsible government investment combined with the market outcomes of production at best price.

All parties agree that the disturbing aspect of the New Economy is the failure to produce the highly educated workforce demanded in the knowledge economy.

There is a possibility that the New Zealand high tech sector will become like Israel in that the domestic economy may be in a slump but the electronics, telecommunications and software export leaders enjoy huge success overseas and become an island of prosperity in a sea of gloom. The wets, ousted in the ideological battles of the 1980s when the fis-

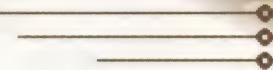
cal fashion was for high public surpluses, tax cuts and leaner government. The subsidies to high tech exporters for marketing research and development have been returning to the political barricades have all gone. The spending by Government on trade promotion is down and the fiscal surplus does not promise a pot of gold even if Government thinking changed. So in the light of the vast Irish expenditure on education, the Israeli investment by Government in pure research and the handy "Investment for Growth Strategy" unveiled by John Howard last December with A\$1.26 billion, including the \$556 million allocation for extra research, the Kiwi cupboard looks bare.

Meanwhile, back in the real world, Steve Sangster, managing director of leading power supply company Innovative Energies, has faxed all and sundry with a list of suggestions of how to ride out the current crisis. He spells out the need to "work together, buy local, be positive, alert, flexible, different and honest," and in a nice little twist, rounds off his message announcing price reductions on his product range. Down south at Tait Electronics, the largest manufacturer of mobile radio systems in the Southern Hemisphere with 90% of its production exported, the decline in the exchange rate is "good news in the long term". Tait's Communications Manager Andrew Trevelyan says the low dollar has to be good for exporters, but worries that inflationary pressures will build up because of higher component import costs.

"We have covered our dollar receipts some way out and when they have caught up we will see benefits from the lower Kiwi," he says.

# Surface Mount '98

International Conference on Electronics Design and Manufacture



## October 6-9, Melbourne Exhibition and Conference Centre.

The Surface Mount conference celebrates its tenth anniversary this year. And to mark the occasion it has invited three speakers from the original conference, who are still active in the industry, to make new presentations.

James Baker is now senior manager of worldwide process engineering with Sun Microsystems. He has spent the past 20 years involved in surface mount assembly and was part of the team that introduced board level SMT to Motorola. Richard Short is the director of marketing at Indium Corporation. He will share his knowledge of optimising reflow processes. And Steve Vandervoort is an Intel engineer responsible for new process

development at the company's Systems Manufacturing Group where the boards are designed and manufactured.

Also on the bill are two chairs of IPC technical committees. Leonard Roach is the chairman of the IPC-2224 Sectional Standard for Design of PC Cards and co-chairman of the IPC-2225 Sectional Standard for Design of Multi-Chip Modules on Laminate Based Materials. Ralph Hersey was chairperson of the Product Assurance Committee for 15 years. He has been deeply involved in the last several revisions of IPC-A-600, including the "E" revision, and is an authority on the standards and guidelines contained within it. He is currently working on a

training/certification program for the IPC-A-600E.

Conference organisers, the Surface Mount and Circuit Board Association, are expecting at least 300 delegates to attend the conference. Early bird discounts are available for registrations before 14 August. Contact the SMCBA on (03) 9568 0599 or by fax on (03) 9568 0622.

As usual, the conference will be run in conjunction with Elenex, the electrical and electronic industries exhibition, which is anticipating 200 exhibitors and 12,000 visitors. A full preview of Elenex will feature in next month's issue of *AEE*. ●

## SM '98 CONFERENCE PROGRAM

### Monday October 5

8.30am — 5.30pm. Surface Mount Rework Course

### Tuesday October 6

8.30am — 5.30pm. Surface Mount Rework Course

12pm. Registration

#### 1pm. Session 1

Reliability of solder connections — simple approaches  
Small and mid range manufacturing  
Outsourcing strategies in SM assembly  
SMT — A roadmap for the future  
5.30pm — 8pm **AGM followed by conference reception**  
10am — 6pm. Elenex

### Wednesday October 7

8.30am — 12.30pm **Session 2**

Low cost solder bumped flip chip technologies for DCA,  
CSP and BGA  
2pm — 5.30pm **Session 3**

BGA process development and implementation  
A practical methodology for introducing new technologies  
10am — 6pm. Elenex

### Thursday October 8

8.30am — 1pm **Session 4**

Optimising a surface mount production process

2.30pm — 5.30pm **Session 5**

Optimising reflow profiles via defect mechanism analyses

9am — 5pm **Session 6**

PC Card design to IPC-2224

7.30pm **Tenth anniversary dinner**

12am — 9pm. Elenex

### Friday October 9

8.30am — 5.30pm **IPC-A-600E Acceptability of printed boards**

9am — 1pm **How to design custom LCDs**

**Industry Day — free sessions on a variety of topics**

10am — 4pm. Elenex

# CONFERENCE HIGHLIGHTS

## Monday

Prior to the conference proper beginning is a two day *SMT Rework Course*. Topics to be covered include: Introduction to SMT Soldering Techniques; Component Identification; Assembly Safety (ESD, Electromigration ; and Handling); Fluxes, Solders and Solvents; Tools and Soldering Aids; Preparation, Standards, Assembly Requirements; The Soldering Process; Component Removal; Component Replacements; Inspection and Evaluation; Trends in SMT and the Future. The presenter is **Terry Clitheroe** of Solder Technologies. He is a certified IPC-A-610 Class A Instructor with many years experience in soldering training.

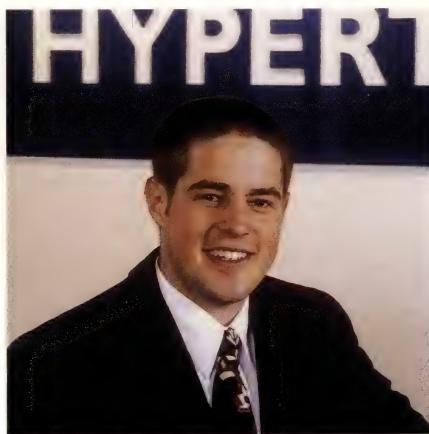
## Tuesday

The first session will begin at 1pm on Tuesday October 6 with a talk by **James Baker** of Sun Microsystems on *Reliability of Solder Connections — Simple approaches*. Baker has been a process engineer/manager in PCB assembly for over 25 years. His paper is based on the premise that despite the wealth of incredibly detailed scientific data available, there is no unified model that allows an engineer to define or predict the reliability of a solder joint. He will outline some relatively simple techniques for making good (but not perfect) reliability predictions.

Following this **Tom O'Reilly** of Hyper-tec will discuss *Small and Mid-Range Manufacturing in Australia*. One of the major challenges that all small and mid-range SMT production lines encounter is their inability to generate economies of scale relative to large international competitors. O'Reilly will discuss the strategies adopted for holding market share through flexibility, customer focus through the selective use of JIT principles, offsetting low economies of scale by lowering stock holding and maintaining high quality in the face of lower manufacturing costs from Asia.

**James Baker** will then return for two more sessions. The first, *Outsourcing Strategies in Surface Mount Assembly*, will focus on the dismantling of existing internal SMT assembly operations and either selling or giving away these manufacturing operations to the 'contract manufacturing' community. SMT assembly is being perceived as a commodity, capable of being provided by

almost any external source. This presentation will provide a view which supports the retention of SMT assembly operations internally rather than contracting it out. The real value of SMT assembly to a company's future will be discussed. And some specific information on when/why to make the decision to 'outsource' SMT will be given.



**Tom O'Reilly**

The next, *SMT - A Roadmap for the Future*, will look at the idea of predicting, precisely, the packaging technology requirements for a company's products 10 years from today. Some tools and techniques are available based on scientific methods (there are even formulas to help define the probabilities of technology events occurring), some based on trends (literature, industry research, benchmark studies) and some based on extrapolation of the history of product and component technologies. The combination of these tools and techniques will help anyone in forecasting the future of technology.

## Wednesday

The second day begins bright and early at 8.30am with a four hour presentation by **Dr John Lau** of Express Packaging Systems on *Low Cost Solder Bumped Flip Chip Technologies for Direct Chip Attach (DCA), Chip Scale Package (CSP) and Ball Grid Array (BGA) Assemblies*. He will discuss the trend in the electronics industry to make products more personal by making them smarter, lighter, smaller, thinner, shorter and faster, while at the same time making them more friendly, functional, powerful, reliable and less expensive. The last few years witnessed an explosive growth in the

research and development efforts devoted to these emerging and advanced packaging technologies. This presentation will discuss vital issues such as the economics, design, materials, process, equipment, quality and reliability relating specifically to this growing industry and address key aspects and questions on CSP, DCA, BGA and solder bumped flip chip packaging and assembly techniques. Dr Lau has more than 26 years of R&D and manufacturing experience in the electronics, petroleum, nuclear and defence industries.

After lunch, Intel's **Steve Vandervoort** will talk on *BGA Process Development and Implementation*. Recently Intel's computer boards began using Ball Grid Array (BGA) package technology for Chipsets and CPU's. This paper will review the use of these packages with practical information for manufacturing. As the industry moves forward, new BGA materials and packaging styles are now appearing in Intel products which has led to additional interconnect and soldering challenges. The Organic Land Grid Array (OLGA) is one such new BGA variation.

Steve has been in electronics manufacturing and process development for 18 years with extensive experience in SMT processes, having installed SMT lines both in the US and in Europe. In the second part of this session, he will discuss *A Practical Methodology for Introducing New Technologies*. Intel uses a Six Step Methodology as one tool intended to provide a consistent approach to process development. In this methodology, development begins with an understanding of the measurement tools that will be used to collect data. Once this is done, development work can proceed, where process capability and stability are established. And finally, process control systems are designed to prevent process excursions. Each of the six steps and their key components will be reviewed.

## Thursday

**Peter Biocca** of Multicore kicks off the day at 8.30am with *Optimising a Surface Mount Production Process*. The surface mount process possesses many variables that need to be considered to achieve reliability and high production yields. Variables that will affect both quality and yields will be found at the solder paste selection level; at the print

# SURFACE MOUNT '98

process; pick and place process and the reflow oven set-up. Another important variable can be the overall solderability of the parts to be soldered, the component terminations and printed circuit board finish. The presentation will discuss world trends in assembly, solder paste chemistry selection, printer set-up and the reflow process requirements to reduce and prevent future soldering defects. Biocca has over 15 years experience in soldering chemistries and alloys and is an active member of IPC and ASM.



**Rick Short**

At 2.30, Indium Corporation's **Richard H. Short** presents a paper on *Optimising Reflow Profiles Via Defect Mechanism Analyses*. New knowledge of defect mechanisms, combined with the enhanced capabilities of modern reflow equipment and materials enable SMT engineers to optimise their reflow profiles based on their specific requirements. Topics to be discussed include ramp-up rates, "soak" zones, peak temperatures, cooling rates, hot slumping, bridging, tombstoning, skewing, wicking, voiding, solder-balling, grain structure, component cracking.



**Leonard Roach**

Running parallel with these sessions is a full day course covering *PC Card Design to Assembly (Using IPC-2221 and 2224)* presented by **Leonard Roach** of Lucent Technologies/Bell Labs. This

course will provide designers and developers with the key principles and understanding of PC Card design, manufacturing and assembly techniques to enhance rapid product realisation. Topics to be covered will include Design for X; Time to Market, Past, Present and Future PC Cards; Roadmaps for components, substrates and assembly.

## Friday



**Ralph Hersey**

The final day begins with a free workshop on *How to Design Custom LCDs*. Presenters will include **Johnny Chung-Lim Chou**, founder and director of Clover Display and Compucon Computers; **Shin-Hung Chiu**, general manager Manufacturing at Clover Display; and **Professor Long-Pei Shi**, chair of the Microelectronic Research Laboratory at Chung Shan University, China.

For those seeking a fuller Friday, **Ralph Hersey** of Ralph Hersey and Associates, will present a workshop on *Acceptability of Printed Boards using IPC-A-600E*. From 8.30am to 5.30pm, Hersey will present the most significant results of an industry-wide effort to establish acceptable printed board manufacturing standards based on technical requirements. This course identifies and discusses the more critical design manufacturing and acceptance requirements for printed boards and forms a baseline of technical requirements and understanding between engineering, design, manufacturing, quality, material, procurement and management personnel.

Hersey is a former chairman of the IPC Product Assurance Committee with more than forty years experience in the industry and has been involved in every revision of the IPC-A-600 to its current Revision E and is recognised by the IPC as an authority on the standards and guidelines contained within it.

PAGE	ADVERTISER	ENQUIRY CODE
38	ACD	1325
9	Adilam	1306
33	Alpine	1321
3	Australian AMP	1302
60	Australian Exhibition Services	1340
19	Avnet Pacific	1313
63	Baltec	1348
61	BEC	1342
21	Braemac	1314
14	Comtest Laboratories	1310
36	Crusader	1323
63	Data Electronics	1347
58	Dewar	1338
12, 46	EMC Technologies	1308, 1333
1	Emona	1300
61	German Chamber of Commerce	1343
13	Hewlett-Packard	1309
62	HPM Technologies	1345
47	Huber + Suhner	1334
63	Interworld	1346
27	IRH Components	1317
56	M&H Power Systems	1336
61	Mayer Krieg	1341
41	Morris Productions	1328
8	Motorola	1305
35, 37,		
39, 45	National Instruments	1322, 1324, 1326, 1332
43	NSD	1330
55	Olympic Batteries	1335
67-70	Philips Components	1350
57	Premier Batteries	1337
58	Priority	1339
2	Protel	1301
62	Redcentre	1344
65	RFI Industries	1349
6	Rojone	1304
40, 42, 44		
	RS Components	1327, 1329, 1331
25	Rubin Group	1316
11	Soanar	1307
32	Tech Rentals	1320
4	Tenrod	1303
29	TJK Technologies	1318
15, 17,		
23, 31	Veltek	1311, 1312, 1315, 1319

# A COMPREHENSIVE GUIDE TO THE AUSTRALIAN MICROPROCESSOR MARKET

Our second microprocessor guide this year is even more comprehensive than before. This new version of the guide has been updated to reflect company name changes, and changes to the distribution channels of some products.

<b>MicroProcessors</b>	<b>Distributor</b>	<b>Phone</b>	<b>URL</b>
AMD	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
AMD	Zatek	03 9574 9644	<a href="http://www.zatek.com.au">www.zatek.com.au</a>
Atmel	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>
Atmel	Insight	03 97627644	<a href="http://www.memecebv.com.au">www.memecebv.com.au</a>
Cirrus Logic	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Cypress	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Crystal	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Dallas	Veltek	03 9574 9300	<a href="http://www.veltek.com.au">www.veltek.com.au</a>
Digital	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Echelon	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Echelon	Veltek	03 9574 9300	<a href="http://www.veltek.com.au">www.veltek.com.au</a>
Holtek	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>
Harris	Avnet	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Hitachi	Insight	03 9762 7644	<a href="http://www.memecebv.com.au">www.memecebv.com.au</a>
Hitachi	Hartec	02 9870 3300	<a href="http://www.hartec.com.au">www.hartec.com.au</a>
Hitachi	Hitachi	02 9888 4100	<a href="http://www.hitachi.co.jp">www.hitachi.co.jp</a>
Hitachi	Tenrod	02 9748 0655	<a href="http://www.tenrod.com.au">www.tenrod.com.au</a>
IBM	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
IDT	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
IDT	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>
Intel	Intel Australia	02 9937 5800	<a href="http://www.intel.com.au">www.intel.com.au</a>
LG Semicon	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>
MicroChip	Avnet	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
MicroChip	Zatek	03 9574 9644	<a href="http://www.zatek.com.au">www.zatek.com.au</a>
Mitsubishi	Adilam	03 9761 4466	<a href="http://adilam.com.au">adilam.com.au</a>
Mitsubishi	Tenrod	02 9748 0655	<a href="http://www.tenrod.com.au">www.tenrod.com.au</a>
Motorola	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Motorola	Veltek	03 9574 9300	<a href="http://www.veltek.com.au">www.veltek.com.au</a>
Motorola	Future Electronics	03 9899 7944	<a href="http://www.future.com.ca">www.future.com.ca</a>
National Semiconductor	Avnet	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
National Semiconductor	Hartec	02 9870 3300	<a href="http://www.hartec.com.au">www.hartec.com.au</a>
National Semiconductor	ACD	03 9763 4788	<a href="http://www.memecebv.com.au">www.memecebv.com.au</a>
NEC	Soanar	1300 365 551	<a href="http://www.soanar.com.au">www.soanar.com.au</a>
Philips	Passive Electronics	03 9561 6288	<a href="http://www.mcvan.com.au">www.mcvan.com.au</a>
Philips	Soanar	1300 365 551	<a href="http://www.soanar.com.au">www.soanar.com.au</a>
Siemens	ACD	03 9763 4788	<a href="http://www.memecebv.com.au">www.memecebv.com.au</a>
SGS Thomson	Veltek	03 9574 9300	<a href="http://www.veltek.com.au">www.veltek.com.au</a>
ST Micro Electronics	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Sun	Sun Microsystems	02 9844 5000	<a href="http://www.sun.com">www.sun.com</a>
Sybiosis	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Temic	Avnet-Pacific	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Temic	Braemac	02 9550 6600	<a href="http://www.braemac.com.au">www.braemac.com.au</a>
Texas Instruments	ACD	03 9763 4788	<a href="http://www.memecebv.com.au">www.memecebv.com.au</a>
Texas Instruments	Avnet	02 9878 1299	<a href="http://www.avnet-pacific.com">www.avnet-pacific.com</a>
Texas Instruments	Zatek	03 9574 9644	<a href="http://www.zatek.com.au">www.zatek.com.au</a>
VLSI	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>
Zilog	GEC	02 9638 1888	<a href="http://www.gec.com.au">www.gec.com.au</a>

# You'd expect Aussie battery packs to be better, but not cheaper!



Olympic Batteries, the all Australian battery company and leaders in battery pack manufacturing, cover the complete spectrum of battery requirements including charging and analysing. Olympic Batteries can supply you with any type of battery including NiCad, NiMH, Lithium, Lithium Iron, Sealed Lead Acid, Button Cells and Phone Packs.

Olympic Batteries has the manufacturing and supply flexibility to accommodate all requirements, from small run orders through to high volume business, at the most competitive prices available. Olympic Batteries also have a large variety of stock on hand for immediate delivery.

You can be assured Olympic Batteries will meet your requirements and support your business with the latest battery technology available. So call us today and let our expert staff assist you in meeting your organisations battery requirements.

## FREE CALL 1800 657 775



Cnr South Road & Grand Junction Road  
WINGFIELD, S.A. 5013  
Ph: (08) 8262 4188 Fax: (08) 8262 7477  
Email: [olympicb@ozemail.com.au](mailto:olympicb@ozemail.com.au)

# NEW PRODUCTS

## Small dc-dc converter



Ericsson has launched the PKF 4000A I series which it claims is the world's smallest 2A dc-dc converter. The first model, the PKF 4111A, provides a fully isolated 5V at 2A output in a 48x24mm footprint.

The series is targeted at decentralised 48V and 60Vdc power systems and is available in both SMD and through-hole versions. Full output is achieved without heatsinks or forced cooling making it suitable for applications in IT and telecommunications systems. It has

been designed to provide low EMI, both radiated and conducted, when measured in accordance with VDE, FCC and CISPR standards.

The low profile package enables board spacing down to 15mm and it is suitable for temperature in the -45°C to 100°C range. Users can adjust the output voltage from 4.3V to 5.8V with an external resistor. Facilities are also included for remote control and synchronisation of switching frequency to an external TTL signal between 520kHz and 688kHz.

**Enquiry number: 1217**

## Imaging software

The Dindima group has announced the release of version 2.2 of its scientific and industrial imaging software Matrox Inspector. It has been optimised for MMX technology. Typical applications include off-line industrial inspection, microscopy, med-

ical visualisation, image cataloguing and biological analysis.

The package contains a complete set of functions for image capture processing, blob analysis, gauging/measurement and pattern recognition/matching.

**Enquiry number: 1297**

## Low voltage op amps

Veltek has released the Maxim MAX4240-MAX4244 series of single/dual/quad low-power, low-voltage op amps. They provide 90kHz gain-bandwidth products while drawing 10µA per amplifier.

The op amps operate from a single supply of 1.8V or 5.5V or dual supplies of ±0.9V to ±2.75V. The MAX4241 and MAX4243 have a shutdown mode that places the outputs in a high impedance state and reduces the supply current to

1µA. The input common mode extends 200mV beyond each rail and with 100kΩ loads the outputs typically swing to within 8mV of each rail.

The single MAX4240 come in a SOT23-5 package and the single MAX4241 in an 8-pin µMAX package. The dual MAX4242 comes in an 8-pin µMAX or SO and the dual MAX4243 comes in a 10-pin µMAX or 14-pin SO. The quad MAX4244 comes in a 14-pin SO.

**Enquiry number: 1233**

## Power supply supports VFDs



Statronics has released a full-range power supply for industrial and consumer products featuring 6 outputs. Outputs provided are 5V at 2.5A, +12V at 1A, -12V at 0.3A, -25V at 0.1A and a two-phase, 3.5V RMS centre-tapped and biased output for the filament drive of vacuum fluorescent displays.

Further features are an input range of 90V to 270V RMS, compliance with international safety and EMC standards, high efficiency, and a compact size of only 150 x 60 x 29mm.

**Enquiry number: 1235**

For more information on any of the products or advertisements in this issue, visit the AEE website [www.aee.com.au](http://www.aee.com.au)



## M+H Power Systems Pty Ltd

### Victoria (Head Office):

Tel: (613) 9763 0555, Fax: (613) 9763 0577

### New South Wales:

Tel: (612) 9667 1600, Fax: (612) 96671221

### South Australia:

Tel: (618) 8340 2664, Fax: (618) 8340 1484

### Queensland:

Tel: (617) 3344 4300, Fax: (617) 3344 4577

### Western Australia:

Tel: (618) 9245 1121, Fax: (618) 9245 1510

**Enquiry No. 1335**



• TWO WAY • CELLULAR • VIDEO • DRILL • COMPUTER

Increase Battery Life  
Improve Reliability  
Reduce Costs  
With System 5



*Now* AVAILABLE WITH PRINTER OPTION



AVAILABLE ON  
NSW CONTRACT  
IT'S 2070

**System 5** not only charges your battery but tells you how good or how poor your battery really is.

**System 5** rejuvenates your battery by removing the unwanted memory. As it is microprocessor controlled it will maximise the life of your batteries by ensuring they are not overcharged.

**Analyse - Charge - Condition - Life Test.**

**System 5** is flexible and easy to use and will operate on a wide range of Nickel Cadmium and Nickel Metal Hydride Batteries.

Please call for more information on a demonstration.



For Range, Technology and Service, see... **PREMIER BATTERIES PTY LTD** ACN 003 149 013

Unit 9, 15 Childs Road, Chipping Norton NSW 2170 Australia

Tel: (02) 9755 1845 Fax: (02) 9755 1354

Website: [www.livinet.com.au/premier/](http://www.livinet.com.au/premier/) E-mail: [premierbat@one.net.au](mailto:premierbat@one.net.au)

# NEW PRODUCTS

## PLL solution



The Vectron TRU-050 phase lock loop (PLL) solution is available from Zatek. It is an ASIC with a quartz stabilised VCXO that performs clock recovery and data retiming, clock frequency translation and clock smoothing functions.

Because the VCXO incorporates a high Q crystal, the output jitter is less than 20ps. The input data ranges from

8kb/s to 65Mb/s and the output has a tri-state option. The supply voltage can be either 3.3V or 5V and it is packed in a hermetic 16-pin ceramic DIL with a surface mount option.

It is suited to applications in ATM, SONET/SDH, XDSL, network communications, digital audio/video and PVX systems.

**Enquiry number: 1240**

## Thermal printers

Avnet Pacific has a range of Seiko thermal printers for use in electronics applications.

The LPT1245 is a compact lightweight thermal line printer powered by lithium-ion batteries. It is capable of printing at a maximum speed of 62.5mm/s. It has a high resolution on a paper width of

58mm and requires 5V to run at low currents. It is suited for use with various kinds of portable compact devices such as hand-held data loggers, desktop data loggers, industrial calibration gear, portable test equipment, taxi meters, etc.

**Enquiry number: 1299**

## Documenting process calibrators

MB&KJ Davidson has released the Druck DPI610 pressure documenting pressure calibrator and TPX II multi-function documenting process calibrators. Menu-driven and multi-language, they can simulate, source and measure a variety of process parameters.

Both instruments incorporate a clear, task-oriented dual display, which can be configured according to the application. Test results may be stored in non-volatile memory and transferred to a PC system for further analysis via an integral RS232 port or PCMCIA card. Up to 400 calibra-

tions can be stored on each 1MB card.

With a hand pump, the DPI610 is able to generate, measure and display pressures and vacuums, as well as loop currents and test voltages. Standard display tasks include transmitter, transducer, valve, switch and leak testing. The TRX II can measure, source and simulate thermocouples, RTDs and temperature transmitters; source and measure volts, current, ohms, frequency and pressure; and perform datalog, ramp, step, scale, switch, pulse and counter/totaliser functions.

**Enquiry number: 1227**

## IDC connectors

Soanar has released Pancon MAAS-CON 0.1 and 0.156in pitch IDC connectors. They are used to bring signals or power to a printed circuit board using discreet wire or pre-notched flat cable.

Connectors are offered in the Circuit End (CE) and Circuit Through (CT) styles with colour coded ribs for AWG size identification. Contrasting dots below ribs are also used to identify the CT connector,

which is used for daisy chain applications.

Optimum connector performance is provided by the IDC contacts piercing the insulation of each wire on two sides to make four gas-tight connections. Contacts are copper alloy with tin over nickel plating. The connectors are UL listed and CSA certified, and are capable of currents up to 12.5A.

**Enquiry number: 1236**

For more information on any of the products or advertisements in this issue, visit the AEE website [www.aee.com.au](http://www.aee.com.au)

## 24 VOLT POWER SUPPLIES

60 watt to 480 watt

- \* HIGH EFFICIENCY
- \* LOW WEIGHT
- \* LOW COST
- \* DIN RAIL MOUNT
- \* 2.5A, 5A, 10A, 20A OUTPUT
- \* COMPACT HOUSING
- \* IEC 950

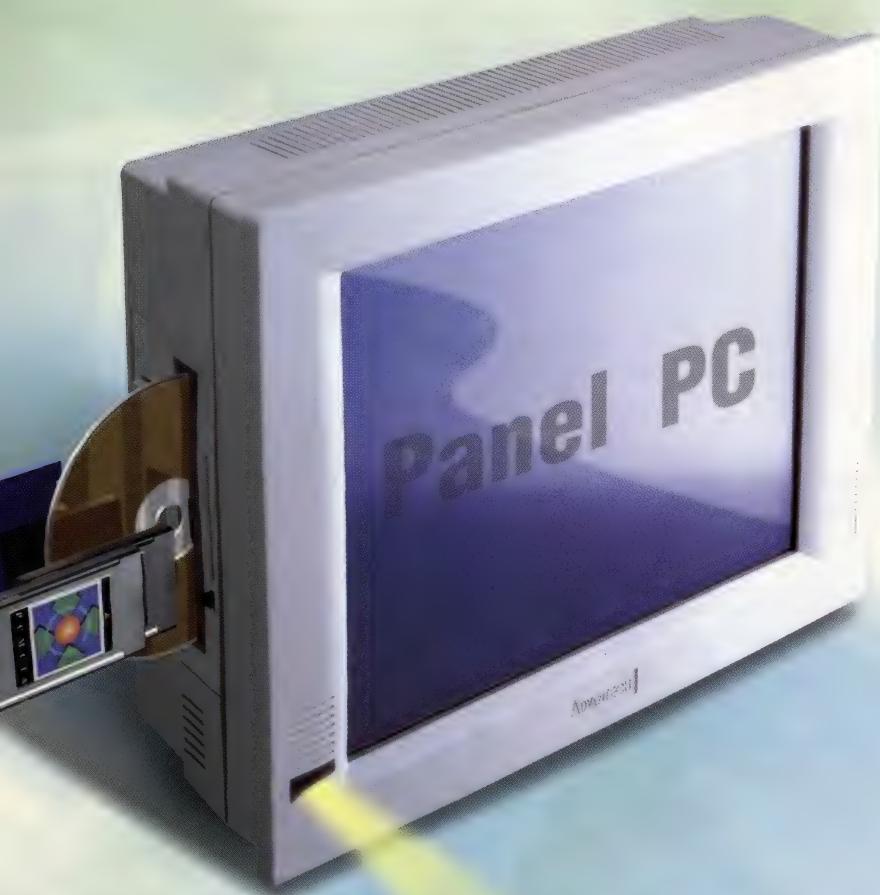


**DEWAR ELECTRONICS Pty. Ltd.**  
PHONE: (03) 9725 3333 (02) 9878 8788  
FAX: (03) 9725 6003  
email: [sales@dewar.com.au](mailto:sales@dewar.com.au)

Enquiry No. 1338

# Panel PC Fits for Integration

Light • Slim • Easy to install



Desktop



Panel Mount



Swing Arm



Wall Mount



Rail Mount

## Complete PC functions : ( PPC-140T )

- 13.8" TFT color LCD (resolution: 1024 x 768)
- Intel Pentium® MMX CPU, up to 233 MHz
- Supports up to 128 MB SDRAM
- 2.5" hard disk drive bay
- 1.44 MB 3.5" floppy disk drive
- One CD-ROM drive
- Four serial ports, one parallel port
- PCMCIA slot (type II x 2, type III x 1)
- Built-in 100/10Base-T Ethernet interface
- One PCI/ISA expansion slot
- Two USBs
- Two built-in speakers
- Optional analog resistive touchscreen



**PPC-140**  
Pentium® MMX 233 MHz



**PPC-120**  
Pentium® MMX 233 MHz



**PPC-102**  
Pentium® MMX 233 MHz



**PPC-55**  
386 SX-40 Processor



# NEW PRODUCTS

## Operator interfaces



The Red Lion Paradigm series is now available from Pryde Measurement. It provides a range of operator interface panels for use with PLCs and micro-PLCs.

Using EDICT-97 software, the Paradigm can talk to most PLCs on the market as well as variable speed dri-

ves, bar code readers, weighing systems and intelligent panel meters. It provides historical trends and date-time stamped records of plant activity. The interface are available with backlit LCD and vac-

uum fluorescent display. The display size ranges from 2 x 20 characters to 4 x 20 characters. User software is stored in 64K battery-packed RAM. Serial ports include RS232 and RS485 for PLCs; and RS232 for printers and modems. The interfaces are IP65 rated.

**Enquiry number: 1239**

## SRAMs for networking

Avnet Pacific has introduced a 4Mb flow-through synchronous Zero Bus Turnaround (ZBT) SRAM that it says is the world's fastest. The Integrated Device Technology chips are suitable for performance-driven networking products, such as switches and routers, that require memories with both high bandwidth and the capability of

intermixing read and write operations.

The IDT71V546 (pipelined version) and IDT71V547 (flow-through version) are 3.3V ZBT SRAMs with 128K x 36 configurations. The 71V547 operates at 100MHz with an 8ns clock-to-data access time. The 71V546 pipelined device operates at 133MHz with a 4.2ns clock-to-data access rate.

**Enquiry number: 1298**

## Gerber software

Satcam has released version 5.0 of the Advanced CAM Technologies CAM350 family. The software package for viewing, editing and manipulating Gerber files comprises the CAM350, ECAM, PCGerber and GerberView.

New features in the family include: bed of nails test fixture; manufacturability check to find acid traps, slivers, etc; oversize/undersize any-shaped

polygon; direct CAD system interface from Zuken-0Redac; netlist extract handles blind/buried vias; and full BASIC support has been added to the macro language.

A system of graded access codes allows users to pay for only the levels they need, but also to upgrade as the need arises.

**Enquiry number: 1237**

## DANGER: DO NOT OPERATE WITHOUT VISITING ELENEX 98



- Hundreds of new products and ideas
- Over 200 companies exhibiting
- New product releases
- New ways to increase profitability
- New ways to improve your competitive edge
- Solutions from industry experts

Staged concurrently with AUTOMATE Australia's leading manufacturing technology exhibition.

### The 10th Australian International Electrical & Electronics Industries Exhibition Melbourne Exhibition Centre 6-9 October 1998

• Tues 10am-6pm • Wed 10am-6pm • Thurs 12 noon-9pm **LATE NIGHT** • Fri 10am-4pm



Australian Exhibition Services Pty Ltd 424 St Kilda Road Melbourne Victoria 3004 Australia Tel +61 3 9261 4500 Fax +61 3 9261 4545

COCKLE 3407

<http://www.ausexhibit.com.au> E-mail: Shows@ausexhibit.com.au

## Software Development for Embedded Real-Time and Internet Applications

A WindRiver Systems Technology Seminar  
with

Subbu Deivanayagan, Applications Engineer, WRS Asia  
Steve Elliott, Principal Software Engineer, MK

Learn from the market leader about the latest products and development tools for embedded software development utilising Tornado/VxWorks.

- Embedded Internet
- Advanced WindView-2.0
- "LOOK!", "WindNavigator", "CodeTest"

For seminar details refer to :

[www.mayerkrieg.com.au/Computing/News.htm](http://www.mayerkrieg.com.au/Computing/News.htm)

All sessions are 3-4 hour morning seminars, include comprehensive demos and a light breakfast.

Perth: 31.8.98 Adelaide: 1.9.98 Melbourne: 2.9.98  
Sydney: 3.9.98 Canberra: 4.9.98.

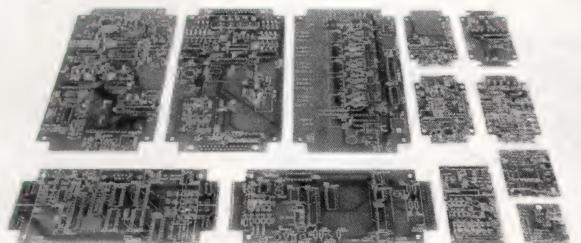
### Registration

Mayer Krieg & Co : Tel. 08 8291 3249 ;  
Fax 08 8291 3200; Email [wb@mayerkrieg.com.au](mailto:wb@mayerkrieg.com.au).

Enquiry No. 1341

# \$309.50 FOR 12 PROTOTYPES

\*Conditions Apply



Fill 10.6 x 16.6 inches (27 x 42 cm) with PCB designs, and have them ALL prototyped for the same cost as others charge you for ONE BOARD.

BEC manufactured PCBs can't be beaten:

- Speed – Super Express Service available
- Economy – Fill a panel with PCBs – same price
- Quality – PTH, SMOBC, NC Routed, Overlay
- Efficiency – PCBs from Protel or Gerber files
- Cost effective prototypes
- Competitively priced production runs
- In-house laser plotting

# BEC

BEC Manufacturing Pty Ltd

Brisbane Tel: (07) 3881 1321 Fax: (07) 3205 5879

Website – <http://ats.com.au/~bec>

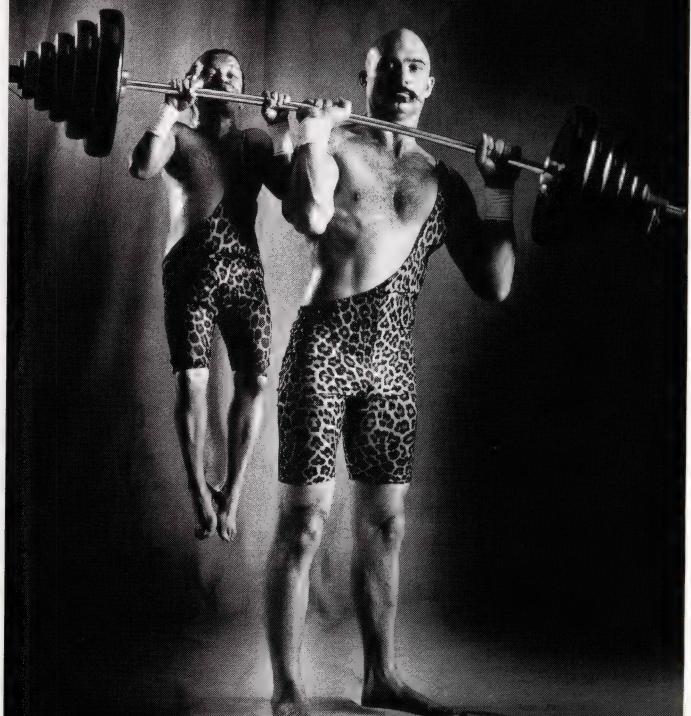
E-mail: [bec@ats.com.au](mailto:bec@ats.com.au)

Enquiry No. 1342



# electronica 98

## We are building up strength!



At one of the most modern trade fair centres in the world, more than 3,000 exhibitors on 150,000 m<sup>2</sup> of exhibition space will present the world's finest electronics from the following sectors:  
• Semiconductors, sensors, microsystems  
• Electromechanical components • Passive components • System components and displays  
• ED/EDA, measuring, testing and inspection technology

# electronica 98



® The International Trade Fair for Components and Assemblies in Electronics

November 10–13, 1998  
New Munich Trade Fair Centre

### Further information from:

German-Australian Chamber of Industry and Commerce

Level 2, St. Andrew's House, Sydney Square  
464 Kent Street, Sydney South NSW 2000  
P.O.Box A 980, Sydney South NSW 1235  
Tel. (02) 9265-2255/2256, Fax (02) 9265-2211  
E-mail: [ahkaust@magna.com.au](mailto:ahkaust@magna.com.au)  
<http://www.electronica.de>



Enquiry No. 1343

# NEW PRODUCTS

## Surge reduction system



Eltek Pacific has introduced the Panamax Towermax KSU 240V surge reduction system. Designed for Australian conditions, it is C tick approved and provides protection for telephone key systems, small PBXs and mini computers against power and lightning related disturbances.

The modular design of the system makes it possible to protect all incoming

communication and power lines coming into the telephone or computer system. The base ac protector has a thermal fuse to shut off power connected to the equipment in case of extended over voltage; a 10A circuit breaker and an on-off switch. It has a 700V clamping level and the ability to handle an unlimited number of non-catastrophic surges.

**Enquiry number: 1238**

## PHOTONICS

### The art of optical electronics

Australia has one of the world's foremost groups in optical communications research at the Australian Photonics Cooperative Research Centre (CRC) with facilities in Sydney, Melbourne and Canberra.

The CRC has restructured itself to provide SMEs with a single point of contact – Redcentre.

#### Some specific services offered are:

- ◆ Contract Design and Product Development
- ◆ Design for Manufacture by Experienced Product Engineers
- ◆ Specialists in Fibre-optics, Optoelectronic and High-speed Electronics
- ◆ Access to World-class Photonics Instrumentation
- ◆ Device and System Testing

*Redcentre offers these services and others by providing:*

- ◆ Technical Advice
- ◆ Rapid Access to Engineering Facilities to Prototyping
- ◆ Opportunity Analysis – Evaluation – Business Network Establishment
- ◆ Applied Research and Development Contracts
- ◆ Test and Measurement Services
- ◆ Training – Short Courses

**For further information on the Photonics Redcentre:**

Telephone (03) 9347 2299  
Free Call 1800 246 250

Photonics  
Redcentre

Photonics Redcentre – Rapid Engineering Development  
“Networked technology access with effective commercial solutions”

**Enquiry No. 1344**

## Analogue switches

Siliconix, represented in Australia by Braemac, has cut the size of its most popular analogue switches by more than half with the introduction of a new TSSOP-16 package option. The devices have a footprint of 6.4 x 5.0mm and a height profile of just 1.1mm. They are suited to cellular phones, portable data acquisition instruments, portable automatic test equipment, and battery-powered systems.

Available in the TSSOP-16 package are the DG201BDQ, DG201HSDQ, DG202BDQ, DG211BDQ, DG212BDQ, DG213DQ, DG308BDQ, and DG309BDQ.

These general-purpose quad analogue switches are built on a proprietary high-voltage silicon-gate process.

The devices combine low on-resistance, leakage currents, and charge injection with fast turn-on times.

For example, the DG201BDQ and DG202BDQ offer on-resistance of 45Ω, with a 120ns turn-on time and 1pC charge injection.

The high-speed DG201HSDQ offers on-resistance of just 25W and turn-on-times of 38ns. The other analogue switches offer similar improvements in all key specifications compared with industry-standard devices.

**Enquiry number: 1228**

For more information on any of the products or advertisements in this issue, visit the AEE website [www.aee.com.au](http://www.aee.com.au)

**HPM**  
TECHNOLOGIES

**ZACH**  
**HX-300 SERIES**

OEM Programmable Control & Data Pagers

*The HX-300 series of Programmable Control & Data Pager is a world class development from HPM Technologies. Zach is a small, low power OEM Programmable Control & Data Pager designed for specialised paging applications and OEM products.*

- Unique radio paging product
- Straight through data pager
- Individually programmable for user specific applications
- Direct interface to a wide variety of peripherals, control and messaging products.
- Programming versatility
- Over air programmable and sub addressing

*For further information contact:*

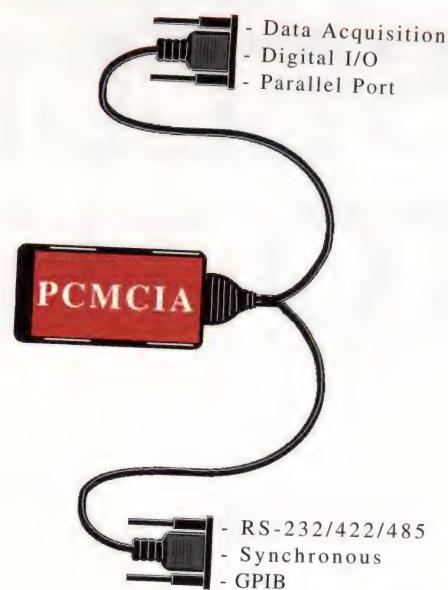
**H.P.M. Technologies Pty Ltd**  
**Tel: +61 3 9877 5033**  
Fax: +61 3 9877 5133    E Mail: [hpmtech@hpmtech.com.au](mailto:hpmtech@hpmtech.com.au)  
Web Page: <http://www.hpmtech.com.au>

**Creating Business Advantage**

**Enquiry No. 1345**

Interworld

# Interface cards - Our speciality!



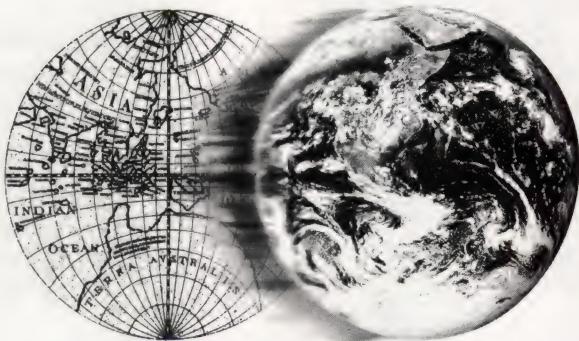
**INTERWORLD ELECTRONICS & COMPUTER INDUSTRIES (AUST) PTY LTD**

933 Glenhuntly Road, Caulfield South VIC 3162 Australia

Tel: (03) 9563 5011 Fax: (03) 9563 5033 E-mail: iec@ieci.com.au



Enquiry No. 1346



**New World technology for monitoring the old world...**

**DataTaker is your solution.**

Innovative, compatible technology that costs less with proven standalone, local and remote applications. Forget the hassle of old chart recorders and messy PC cards, your fully programmable and expandable DataTaker is ready to go just by adding any sensor. No complex programming - simply connect and collect. All this and a 3 year warranty.

*Call the data acquisition experts...*

**DataTaker™**  
Your Solution to Data Logging



**DATA ELECTRONICS**  
PH: (03) 9764 8600  
(02) 9971 7994  
[www.datataker.com](http://www.datataker.com)

Enquiry No. 1347

**AMIX™** The Real-Time Multitasking Kernel

NEW  
TCP/IP  
Stack

680x0, 683xx  
i960 family  
R3000, LR330x0  
80x86 real/protected mode  
29000  
Z80, HD64180  
PPC32  
4-ARM

- Full-featured, compact ROMable kernel with fast interrupt response
- Pre-emptive, priority based task scheduler with optional time slicing
- Mailbox, semaphore, event, list and memory manager
- Kwiklook™ Debug Tool couples with SDS SingleStep™ for Windows task-aware debugging.
- File system for floppy, 1DE and RAM Disk access
- PC-hosted development tools
- Comprehensive, clear documentation
- No-hidden-charges site license
- Source code included
- Reliability field-proven since 1980

*Download a free demo and product description.*

↑↑↑  
**BALTEC  
SYSTEMS**  
Pty Ltd

9/87 Webster Rd  
Stafford Qld 4053  
Ph: (07) 3356 8111  
Fax: (07) 3356 8777  
Email: [info@baltec.com.au](mailto:info@baltec.com.au)  
Web: [www.baltec.com.au](http://www.baltec.com.au)

Enquiry No. 1348

# SELLING CHIPS TO THE MASSES

## Kenneth Kim — IMD

The biggest news five years ago was that IBM, for so long the master of this part of the universe, was on the nose, a victim of its own arrogance as much as a swag of upstarts snapping at its heals.

But five years is a long time in the computer business — long enough to reinvent an entire company.

That IBM has done this, and done it with conspicuous success, was bought home by the recent visit of Dr Kenneth Kim to Australia. Kim is the Asia Pacific director of IBM Microelectronics Division (IMD). After a PhD from Columbia, he cut his teeth with Motorola Corp, rising to head its Asia Pacific division. He joined IMD in 1996.

His brief is to lead the IBM attack on the \$21 billion custom chip industry. The industry is expected to grow to \$52 billion by 2002, so a significant slice of this is worthwhile in anyone's language.

IMD started life as the microelectronics division of IBM, tasked with developing integrated circuits to run its range of computers and peripherals. Today it is an independent company selling a huge range of custom logic to all and sundry. "We don't even have IBM itself as a guaranteed customer. We have to compete on an even basis with everyone else for its

business. Sometimes it's even harder for us to make a sale into IBM than for outsiders", Kim laments.

About 60% of IMD's total revenue still comes from IBM, but a growing proportion comes from outside. He says that by the year 2000, the proportions will have reversed, and IBM itself will account for only 40% of total sales.

Even so, IBM Microelectronics is now one of the leading providers of customised logic. In total world wide sales it ranks second only to NEC.

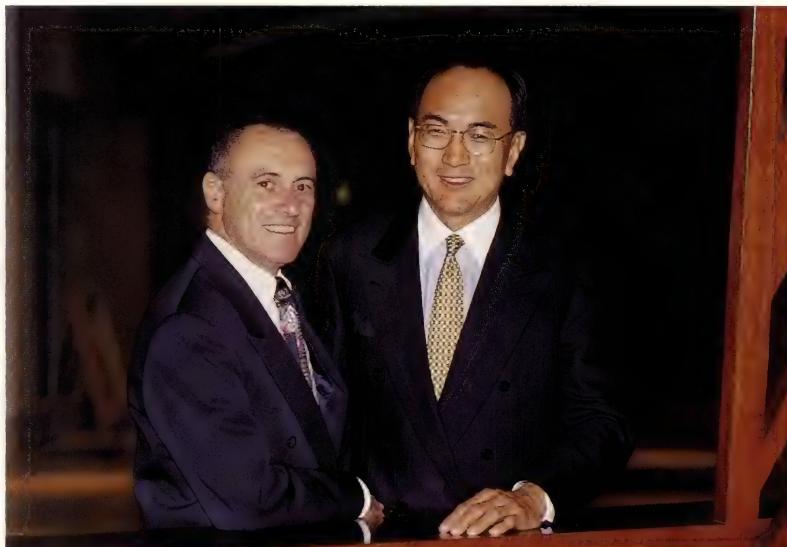
The shift began in 1992, when IBM reconstructed its micro-electronics division as a separate cost centre. Its first move was to sell memory chips and other

types of commodity products in which it had superior or competitive technology. However, the company ran right into the chronic glut in memory production capacity that occurred in the early 1990s. The experience was enough to convince IBM that its expertise was not going to be in shifting millions of items at a few cents each. Rather, it was going to be in shifting its considerable intellectual capital, in reasonable numbers, but with a tremendous amount of value added.

Hence its move into customised logic. The com-

pany still sells a wide range of memory products, but IBM's strategy, as Kim tells it, is to sell application specific circuits with as much on-board IBM intellectual property as possible. This starts with complete applications on the chip — the company has recently completed a GSM phone chip and a set top box chip for cable TV applications, all the way down to ICs that contain nothing but the customers own intellectual property. Predictable, most of the demand is for ICs in the middle range, where IBM can supply modules that represent part of a total solution.

It currently has 25 different cores, including a PowerPC which can be inte-



Asia Pacific director of IMD, Dr Kenneth Kim (right), with newly appointed regional sales manager John Robinson.

grated with the customer's own interface logic, a picoJava core, for customers who wish to build Java compatible hardware, as well as for a digital signal processor with functionality identical to the industry standard Texas Instruments TMS320C54X. This is in addition to a host of lower-order logic modules designed to take the pain out of designing ASICs.

But this design ability is only half of the story, according to Kim. He says a second part of the attraction of IBM is in its technology. This now includes the ability to deliver track width of 0.18 microns, which he says, is close to the fundamental limit at which further decreases in track width cause increases in line capacitance, so slowing down the circuit. Smaller track widths allow more devices on the die, but the two effects tend to cancel each other out. A move to copper interconnects has improved matters somewhat, but the improvement has only been incremental.

He says a more important design advance has been the move to low power design, which means customers can reduce battery size, or alternatively increase battery life, in small portable devices. In desktop devices, it means power supply or cool-

ing requirements are reduced. Either way, it means that the total cost of the item can be reduced substantially.

Kim says IBM is now attacking three market segments. It retains its interest in computing, and still makes the majority of the significant chips in IBM computers, from mainframes through to desktop PCs. "This is a significant source of intellectual property in its own right, which we can use to develop cost effective solutions for other customers", he says.

The company has also developed an interest in communications devices, hence a recent deal with CommQuest, which has delivered industry-leading wireless communications technology.

The third market segment is the consumer electronics market. This market segment has been the most significant driver of its business in Japan and Korea, where the majority of consumer electronics originate.

Kim is visiting Australia because he is anxious to increase the company's slice of the Australian marketplace. He says a number of IBM's most significant customers have established design factories in Australia, and it is imperative that IBM get close to the designers in order

to get its products specified at the appropriate time. He says most of this demand will be in the communications sector, although he is on the lookout for demand from any part of the market.

The company has no desire to establish either a fabrication plant or a design facility in this part of the world. He says the existing design centres are not geographically focussed anyway, but rather have expertise in different areas.

As for fabs, he says the company is already adequately serviced by its network of fabs in the US, Europe and Japan, and does not require any others. He says the economics is so challenging that building new ones is increasingly problematic. "Moore's Law still operates. That is, computing capability doubles roughly every eighteen months." The implication is that so does everything else — the number of artefacts in a single IC, the difficulty of building an IC without error, the amount of money required for investment. The only thing that is not increasing is the payback time.

Even with all this difficulty, however, there is no doubt that there is a pot of gold awaiting those who can do micro-electronics successfully.

# RF SHIELDING GASKETS

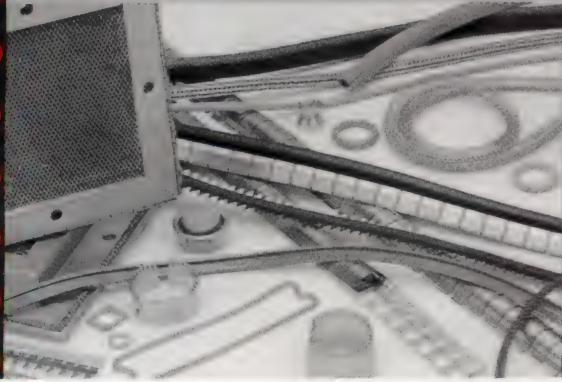
## R.F.I. Industries can offer you...

a wide range of shielding gaskets to provide a cost effective solution to your EMI-EMC problem.

Beryllium copper offering excellent corrosion resistance in finger gaskets available in adhesive backing, clip on and riveted configurations.

Knitted mesh gaskets, conductive elastomers, conductive adhesive, conductive coatings, thermal conductive materials, moulded o-rings, are included in our inventory.

R.F.I. Industries offer a total solution to all your EMI-EMC requirements.



*Our help is only a phone call away!*  
**Call (03) 9762 6733 today!**

**R.F.I. INDUSTRIES**  
R.F.I. INDUSTRIES PTY. LIMITED



A.C.N. 006 273 950  
54 Holloway Drive, Bayswater VIC 3153 Australia  
Tel: (61 3) 9762 6733 Fax: (61 3) 9762 8501  
E-mail: sales@rfi-ind.com.au Web: www.rfi-ind.com.au

Enquiry No. 1349

# DIARY

## AUSTRALIA

### Practical process control for engineers and technicians

August 3&4, Perth  
August 6&7, Melbourne  
August 10&11, Sydney  
August 13&14, Brisbane  
Contact: Samantha Sharpe, IDC, tel (02) 9955 2706, fax (02) 9955 4468.

### Telecommunications opportunities and changes in technology

August 4, Marriott Hotel, Sydney  
Contact: Lara Zheng, AEEMA, tel (02) 6247 4655, fax (02) 6247 9840, email [lzheng@aeema.asn.au](mailto:lzheng@aeema.asn.au)

### SME Alliances for R&D

#### Commercialisation

August 5, Newcastle  
August 6, Milperra  
Contact: Cheonhee Sohn, The Warren Centre, tel (02) 9351 3752, fax (02) 9351 2012, email [c.sohn@eng.usyd.edu.au](mailto:c.sohn@eng.usyd.edu.au)

### Design through acceptance requirements for printed circuit boards

August 10, Adelaide  
August 12, Melbourne  
August 14, Sydney  
Contact: Tony Saunders, tel (08) 8352 3055, fax (08) 8234 1903, email [asaunder@chariot.net.au](mailto:asaunder@chariot.net.au)

### Hands on Internetworking with TCP/IP

August 10-12, Melbourne  
August 31 - September 2, Perth  
Contact: Global Knowledge Network, tel 1800 647 468

### PRINCE 2 Project Management Methodology

August 10-13, Adelaide  
Contact: Audrey Smith, Technology Australia, tel (03) 9841 9733, fax (03) 9841 8374, email [taa@taa.com.au](mailto:taa@taa.com.au)

### General Manufacturing Technology Uptake

August 11, Sydney  
Contact: Cheonhee Sohn, The Warren Centre, tel (02) 9351 3752, fax (02) 9351 2012, email [c.sohn@eng.usyd.edu.au](mailto:c.sohn@eng.usyd.edu.au)

### Cards Australia 98

August 17-19, Sydney Convention and Exhibition Centre  
Contact: Susan Reid, AIC, tel (02) 9210 5751, fax (02) 9223 8216, email [sreid@aicconf.com.au](mailto:sreid@aicconf.com.au)

### Systems Testing & quality assurance techniques

August 31 - September 1, Melbourne  
September 3-4, Sydney  
Contact: IQPC, tel (02) 9223 2600, fax (02) 9223 2622, email [iqpc@ozemail.com.au](mailto:iqpc@ozemail.com.au)

### PC IT 98

September 1-4, Melbourne  
Contact: Australian Exhibition Services, tel (03) 9261, fax (03) 9261 4545, email [shows@ausexhibit.com.au](mailto:shows@ausexhibit.com.au)

### Frame relay technology and implementation

September 7, Melbourne  
September 14, Sydney  
Contact: TTC, tel (03) 9563 4800, email [pietrum@ttc.com](mailto:pietrum@ttc.com)

### ATM technology and implementation

September 15, Melbourne  
September 16, Sydney  
Contact: TTC, tel (03) 9563 4800, email [pietrum@ttc.com](mailto:pietrum@ttc.com)

### ISDN fundamentals and implementation

September 10, Melbourne  
September 17, Sydney  
Contact: TTC, tel (03) 9563 4800, email [pietrum@ttc.com](mailto:pietrum@ttc.com)

### Introduction to LAN and Internetworking

September 11, Melbourne  
September 18, Sydney  
Contact: TTC, tel (03) 9563 4800, email [pietrum@ttc.com](mailto:pietrum@ttc.com)

### AEEMA National Forum

September 17-18, Wentworth Hotel, Sydney  
Contact: John Pozoglou, AIC, tel (02) 9210 5705, fax (02) 9223 8216, email [jpozoglou@aicconf.com.au](mailto:jpozoglou@aicconf.com.au)

### Manufesto 98

September 23-25, Melbourne Convention Centre  
Contact: Julian White, ITIS&M, tel (02) 9490 8201, fax (02) 6276 6257, email [julian.white@exec.csiro.au](mailto:julian.white@exec.csiro.au)

### Year 2000 Workshop

September 25, Perth  
September 29, Adelaide  
September 30, Melbourne  
October 2, Sydney  
October 5, Hobart  
October 7, Canberra  
October 8, Brisbane  
October 9, Townsville  
October 12, Darwin

Contact: Samantha Sharpe, IDC, tel (02) 9957 2706, fax (02) 9955 4468.

### SMT Rework Course

October 5-6, Skills Centre, Carlton  
Contact: SMCBA, tel (03) 9568 0599, fax (03) 9568 0622.

### Surface Mount 98

October 6-9, Melbourne Exhibition and Conference Centre, Southbank  
Contact: SMCBA, tel (03) 9568 0599, fax (03) 9568 0622.

### Elenex Australia

October 6-9, Melbourne Exhibition Centre, Southbank  
Contact: Australian Exhibition Services, tel (03) 9261 4500.

### ILAC'98

October 18-23, Sydney  
Contact: ILAC, tel (02) 9262 2277, fax (02) 9262 3135.

### Asia/Pacific IT Forum

October 25-28, The Regent Hotel, Sydney  
Contact: IDC Australia, tel (02) 9922 5300, fax (02) 9957 2330.

## OVERSEAS

### ICSPAT

September 13-16, Toronto, Canada  
Contact: Christine Fahlen, Miller Freeman, tel 0011 1 (415) 278 5316, fax 0015 1 (415) 278 5200.

### Wescon-IC Expo 98

September 15-17, Anaheim, Ca, USA  
Contact: Electronic Conventions Management, tel 0011 1 (310) 215 3976, fax 0015 1 (310) 641 5117, email [wescon@ieee.org](mailto:wescon@ieee.org)

### High voltage testing

October 7-8, London, UK  
Contact: Mary Newson, ERA Technology, tel 0011 44 (0) 1372 367 000, fax 0015 (0) 1372 377 927, email [conferences@era.co.uk](mailto:conferences@era.co.uk)

### China Magnets 1998

October 19-21, Beijing, China  
Contact: Jennifer Winch, Gorham Intertech, tel 0011 1 (207) 781 9800, fax 0011 1 (207) 781 2150, email [info@intertechusa.com](mailto:info@intertechusa.com)

### Electronica 98

November 10-13, Munich, Germany  
Contact: Dorine Latteman, Messe Muenchen, tel 0011 49 (89) 949 20650, fax 0011 49 (89) 949 20639, email [latteman@messe-muenchen.de](mailto:latteman@messe-muenchen.de)

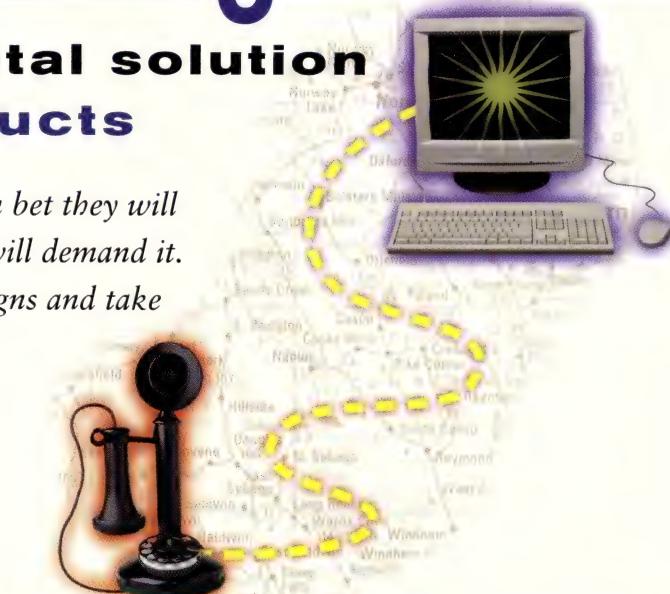
# MICROCONTROLLERS and the Design Engineer

**A roadmap to the digital solution  
for tomorrow's products**

If your products aren't "smart" today, you can bet they will be tomorrow. That's because your customers will demand it. Here's how to build intelligence into your designs and take advantage of the Mechatronics Revolution.

In autos and appliances, in computers and communications devices, and in almost every other consumer, business, and industrial product category, customers are getting more performance features per dollar each year.

Consider a laptop computer: Today's model is lighter and faster than its predecessors but packs a more spacious memory, a far larger disk drive, a faster modem, a built-in CD-ROM or DVD, and a longer-lasting battery. Likewise, today's digital watches sport features such as electronic compasses, thermometers, and even infrared communications. Why does there so often seem to be something new? Because competition makes it mandato-

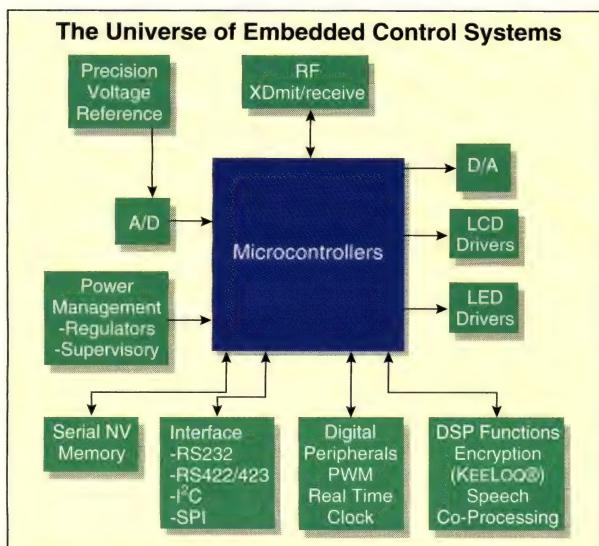


ry for manufacturers to keep up the pace, and because advances in semiconductor and related technologies make product upgrades easier than ever.

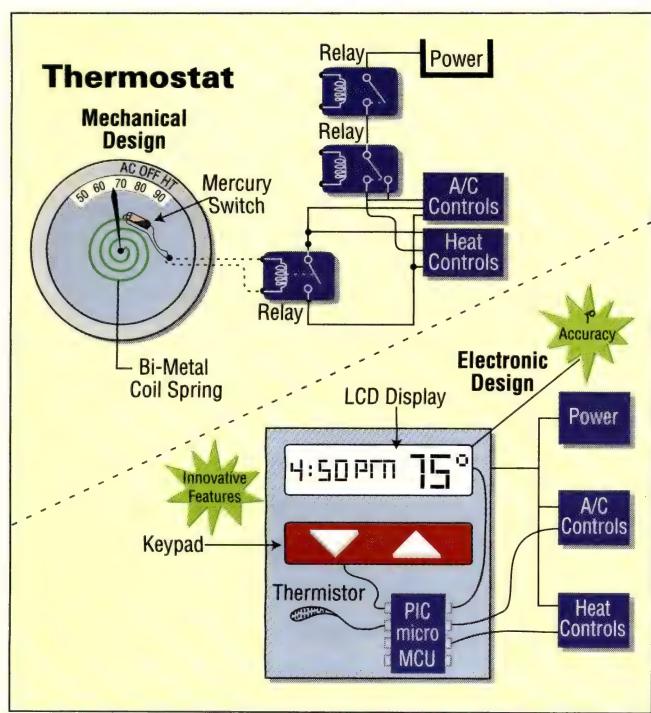
If customers can expect more from their computers and their digital watches, why shouldn't they expect more from their hair dryers and coffee makers? If they can turn on a television (using a features-rich remote controller) and watch a channel aimed at their demographic profile, why shouldn't the products that punctuate their lives be equally eager to please?

## GET SMART

The simple answer is that any product with the potential for intelligence – and that potential is limited only by the designers' imaginations – should be "smart" tomorrow if it isn't smart already. And if it is smart, it could be smarter. Intelligent products are the imperative, and the painful truth is that design engineers who limit themselves to discrete logic components or other, older technologies, are already finding it harder to keep pace. Without question, the time to embrace microcontrollers (MCUs) and embedded systems is now. Microchip Technology Inc., a market leader in MCUs and non-volatile memory, understands the urgency of change and stands ready to support design engineers with a wide array of innovative products and support programs.



**Microchip Technology is focused on the universe of embedded control by providing these typical components, which add intelligence to everyday systems.**



consistent product quality and reliability. Third, there is literally no price premium for using a PICmicro. Fourth, PICmicro-based products require less time/cost in manufacturing, and finally, Microchip Technology offers a full suite of development tools, documentation, and worldwide support you need to get started and to stay current.

To illustrate the benefit of designing with an MCU, consider the curling iron, thousands and thousands of which are sold every year. For years its functionality was limited to a mechanical on/off switch. Today's models feature a digital on/off switch and three different heat settings. What's more, this smart hair curler shuts itself off automatically if left unattended, then heats up quickly when it's picked up for further use. Consumers who inadvertently burn themselves on the original design won't mind paying a few cents more for the additional features. Coincidentally, while using a PICmicro MCU, this improved product costs the curling iron manufacturer less to make. That's profit he'll take to the bank. The cost savings add up quickly as this single sliver of silicon

provides the functionality that would otherwise require multiple components. Smart devices take up less board space, take less time to assemble, and can make you more money.

## PARTNER WITH THE RIGHT MCU SUPPLIER

It's easy to see the past, the present, and the future during a walk up and down the aisles of a nearby home products superstore. You can still see mechanical clocks side by side with digital clocks. You can see timing devices that turn lights on and off to deter burglars when there is no one at home, and timing devices that start swimming pools pumping or spas heating. You can find on/off thermostats as well as the programmable type with temperature settings for any time of day. In the hardware aisle you can find muscle-powered and variable-speed power screwdrivers. The list goes on...and so does the Mechatronics Revolution.

## NEED HELP GETTING STARTED?

Microchip Technology has application engineers throughout the world ready to provide hands-on assistance. Contact Microchip directly to receive a fact-filled Mechatronics PowerPak with complete technical information. Help is also available from Microchip distributors, who must undergo stringent certification procedures. Their training and know-how can help provide a smooth path through the entire PICmicro design process. Arm yourself for winning in the Mechatronics Revolution. There is no reason to wait any longer.

## Potential Applications for the PIC12CXXX

- Battery chargers
- Clocks
- Electric motors
- Electric shavers
- Hair dryers
- Pointing devices
- Remote sensors
- Rice cookers
- Security systems
- Thermostats
- Toasters
- Thermometers
- Toys
- Wristwatches
- Gas detectors
- Remote controls
- Curling irons

## Microchip Asia/Pacific Sales Offices

**Hong Kong**  
RM 3801B, Tower Two  
Metropiazza  
223 Hing Fong Road  
Kwai Fong, N.T., Hong Kong  
Phone: 852-2-401-1200

**India**  
India Liaison Office  
No. 6, Legacy, Convent Road  
Bangalore 560 025, India  
Phone: 91-80-229-0061

**Shanghai**  
RM 406 Shanghai Golden Bridge Bldg.  
2077 Yan'an Road West  
Hong Qiao District  
Shanghai, PRC 200335  
Phone: 86-21-6275-5700

**Japan**  
Benex S-1 6F  
3-18-20, Shinyokohama  
Kohoku-Ku, Yokohama-shi  
Kanagawa 222-0033 Japan  
Phone: 81-45-471-6166

**Singapore**  
Singapore Branch  
200 Middle Road  
#07-02 Prime Centre  
Singapore 188980  
Phone: 65-334-8870

**Korea**  
168-1, Youngbo Bldg. 3 Floor  
Samsung-Dong, Kangnam-Ku  
Seoul, Korea  
Phone: 82-2-554-7200

**Taiwan, R.O.C.**  
10F-1C 207  
Tung Hua North Road  
Taipei, Taiwan, ROC  
Phone: 886-2-2717-7175

**Microchip Technology Inc. • The Americas • Asia/Pacific • Europe • Japan**  
**2355 W. Chandler Blvd. • Chandler, AZ 85224-6199 • (602) 786-7200 • Fax (602) 899-9210**

The Microchip name, logo, PIC, KEELOQ and The Embedded Control Solutions Company are registered trademarks and MPLAB, MP-Driveway, In-Circuit Serial Programming and PICmicro are trademarks of Microchip Technology Inc. in the USA and other countries. All other trademarks are the property of their respective owners. Information subject to change, © 1998 Microchip Technology Inc. All rights reserved.

With so much demand for smarter products, sales of MCUs and non-volatile memory are soaring. Microchip has already shipped more than half a billion of its PICmicro™ family of 8-bit RISC (reduced instruction set computing)-based MCUs, nearly three-quarters of a billion EEPROMs, and more than 100,000 application development systems.

## THE MECHATRONICS REVOLUTION

We are living through a revolutionary period that is impacting almost every aspect of our lives. The nature of the revolution is the momentous shift from analog/electro-mechanical timing and control to digital electronics. It is called the Mechatronics Revolution, and it is being staged in companies throughout the world, with design engineers right on the front lines: Make it smarter, make it smaller, make it do more, make it cost less to manufacture – and make it snappy.

## GET WITH THE PROGRAMMING

Microcontrollers and the variety of program memory technologies are the guns and powder that define the Mechatronics Revolution. Memory technologies include ROM (read-only memory), OTP (one-time programmable), EEPROM (electrically erasable read-only memory), and Flash memory. The leaders of the Mechatronics Revolution are the design engineers who master these MCU options and make the right choice for their particular embedded system applications. The real victors of the Mechatronics Revolution are the consumers who purchase today's and tomorrow's smarter products.

## THE WORLD'S FIRST 8-PIN MICROCONTROLLER

To meet the needs of this growing customer base, Microchip is rapidly expanding its already broad line of 8-bit PICmicro MCUs. The most recent addition, the PIC12CXXX family, is a major breakthrough – it's the world's only 8-bit OTP microcontroller with just 8 pins. Their size, roughly that of a thumb tack, opens up new

## Pick the PICmicro that's right for your application

In addition to the PIC12CXXX, Microchip's PICmicro MCU family includes the baseline 18-28-pin PIC16C5X family, with low voltage (2.5V) that makes it ideal for battery-operated systems; the mid-range workhorse PIC16CXXX, which is rapidly becoming the industry standard for performance and versatility in 8-bit applications; and the PIC17CXXX, featuring a 16-bit instruction word and performance rivaling that of a more expensive 16-bit microcontroller.

Microchip currently offers more than 60 RISC-based PICmicro MCUs, and has several dozen more in development. One key advantage not found elsewhere: "seamless" migration from one device to the next means you can quickly move up the line from the PIC12CXXX to the PIC16C5X to the PIC16CXXX and the PIC17CXXX, and find successively more performance features. Complementing the MCUs is an assortment of hardware and software ("virtual") peripheral devices. Microchip has spent the past two years hard at work honing the PICmicro MCU family to make it the logical choice over the older MCU architectures.

Programming is exceptionally easy. Microchip offers In-Circuit Serial Programming™ and user-friendly development tools, Windows-based MPLAB™ Integrated Development Environment (IDE), Universal Macro-Assembler, C Compiler, Modular In-Circuit Emulators, Modular Device Programmers, Fuzzy Logic Development software, and MP-Driveway™ application code generator.

possibilities for product design, especially because these new parts don't skimp on performance. They are RISC-based (arithmetic and logical instructions execute in 1 microsecond), and they make 6 of their 8 pins available for functionality such as LED (light emitting diodes) display control. On-board peripherals include:

- An analog-to-digital converter
- EEPROM data memory
- Power-on reset
- Watchdog timer, and more

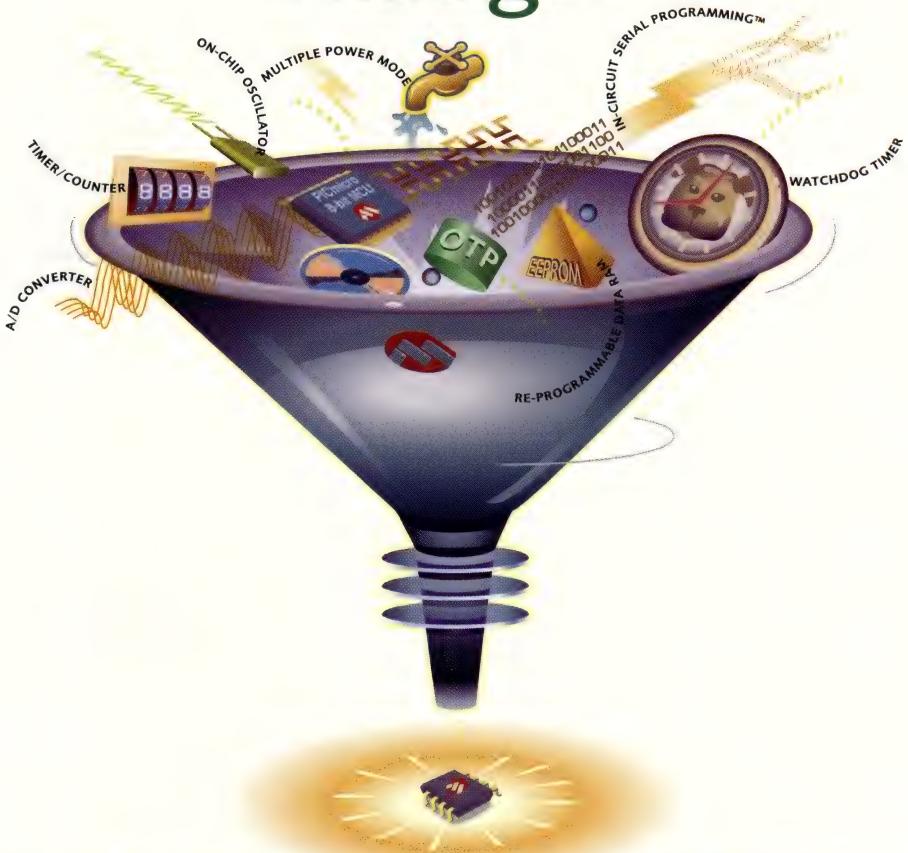
The PIC12CXXX family has an instruction set with only 33 to 35 instructions, so learning to program these devices takes little time. When additional performance is needed, designers can seamlessly migrate their code to any of the other PICmicro devices in Microchip's line of 8-bit MCUs, the largest of which today has 84 pins.

## SMART SOLUTION, SMART CHOICE

What makes a smart PICmicro solution such a smart choice? First, the far greater functionality/flexibility of the MCU compared with discrete components makes it easy to design-in performance improvements that will make your products stand out against their competition and you can earn customer loyalty with an innovative product. Second, using an MCU means better, more

The 8-pin PICmicro MCU Family	Program Memory (Words)	Data Memory (Bytes)		Max Speed	Pins	Peripherals				
		RAM	EE			8-Bit I/O	Timer	WDT	A/D 8-Bit	ICSP
PIC12C508	512x12 OTP	25		4MHz	8	6	✓	✓		✓
PIC12CE518	512x12 OTP	25	16	4MHz	8	6	✓	✓		✓
PIC12C509	1Kx12 OTP	41		4MHz	8	6	✓	✓		✓
PIC12CE519	1Kx12 OTP	41	16	4MHz	8	6	✓	✓		✓
PIC12C671	1Kx14 OTP	128		10MHz	8	6	✓	✓	4 ch	✓
PIC12CE673	1Kx14 OTP	128	16	10MHz	8	6	✓	✓	4 ch	✓
PIC12C672	2Kx14 OTP	128		10MHz	8	6	✓	✓	4 ch	✓
PIC12CE674	2Kx14 OTP	128	16	10MHz	8	6	✓	✓	4 ch	✓

# Want the Power of PICmicro<sup>TM</sup> in an 8-Pin Package?



## Microchip makes it for mechatronics.

Introducing the world's first 8-pin, 8-bit microcontroller—funneling the power and performance of the popular PICmicro family into a tiny 8-pin package. Now you can design intelligence into products where cost or space limitations previously made this impossible. Small personal care appliances. Remote transmitters. Lighting fixtures. Security sensors. Wherever you once thought about small gate array, discrete logic devices, or even electromechanical design, think PICmicro instead. The PIC12CXXX microcontroller family combines Microchip's high-speed, high-performance RISC architecture with extensive on-chip peripherals. Call today to request the Mechatronics PowerPak and find out how the power of an 8-pin PICmicro can make your designs smarter.



**MICROCHIP**

The Embedded Control Solutions Company®  
Microcontrollers • Non-Volatile Memories • ASSPs



RISC architecture • Low voltage, low power  
SOIC and PDIP packages • OTP Microcontrollers

Order Your Mechatronics PowerPak Today!  
Call us at 1-800-437-2767 or Visit us at [www.microchip.com/mechatronics](http://www.microchip.com/mechatronics)

Microchip Technology Inc. • The Americas • Asia/Pacific • Europe • Japan  
2355 W. Chandler Blvd. • Chandler, AZ 85224-6199 • (602) 786-7200 • FAX (602) 899-9210

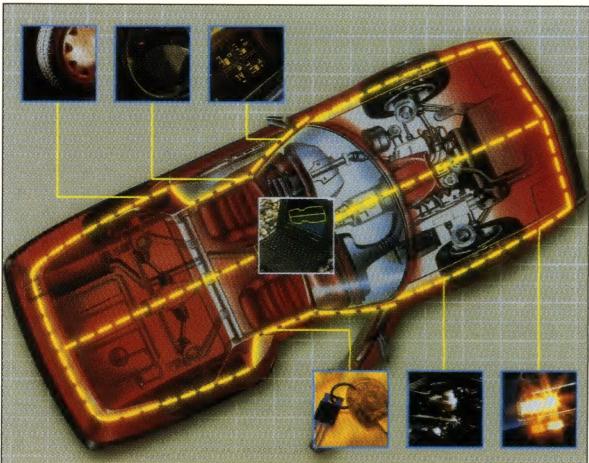
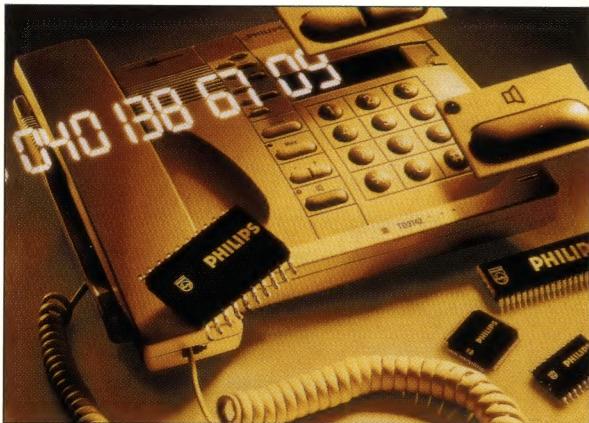
The Microchip name, logo, PIC and The Embedded Control Solutions Company are registered trademarks and In-Circuit Serial Programming and PICmicro are trademarks of Microchip Technology Inc. in the USA and other countries. All other trademarks are the property of their respective owners. Information subject to change. © 1998 Microchip Technology Inc. All rights reserved.

ISO9001 certified since 1993, we have adopted TQM standards and are working towards achieving our own Philips International Quality Award.

We take pride in our delivery performance which is continually measured. Our carefully developed processes are in place to provide the highest level of quality service, such as our bar-coded warehouse, which is designed to eliminate errors.

**Comprehensive,  
reliable and responsive  
customer service**

Philips is a complete solution provider for telephony products through to automotive and multimedia applications.



We provide systems and application information as well as data books, internet pages and CD Rom's for our entire range of products.

Our specialist sales force has enhanced technical support from dedicated field application engineers. In addition, we have a trained network of technical support staff and distributor stock holdings in every state.

To meet customer requirements instantly, we will arrange customer specific stock.

Our application to application EDI and comprehensive delivery status information may be ported from our computer to yours, eliminating errors, providing on-line visibility, and integrating the supply chain from source to assembly line.



Quality  
Endorsed  
Company  
ISO 9001  
Lic 0782

Philips Components.

National distributor:  
Soanar | 300 365 551

**Sydney**  
34 Waterloo Road  
North Ryde NSW 2113  
Ph (02) 9805 4455  
Fax (02) 9805 4466

**Melbourne**  
745 Springvale Road  
Mulgrave VIC 3170  
Ph (03) 9271 3666  
Fax (03) 9271 3688

**Adelaide**  
1 Butler Drive  
Hendon SA 5014  
Ph (08) 8348 5222  
Fax (08) 8347 2390



**PHILIPS**

*Let's make things better.*



Specialists in the supply  
of a full range of  
component solutions

## Component Innovation

Philips is the world's largest manufacturer of passive components, providing a broad range of high-quality, innovative products meeting the diverse requirements of our customers.

Operating within the framework of TQM (Total Quality Management), our product range includes ceramic capacitors, film capacitors, electrolytic capacitors, fixed and variable resistors, delay lines and filters as well as quartz crystals and oscillators.

With fifteen years' experience in the area of surface-mount technology, Philips can offer an exceptionally wide and varied surface-mount programme covering virtually all application areas. We are also active in developing multifunctional components, high-frequency filters, piezo transformers and integrated passive components (combining resistors, capacitors and inductors in a standard semiconductor package).

# Create the future ...



Advanced devices for communications, multimedia, consumer electronics, identification and automotive applications.

## Application specific Integrated Circuits

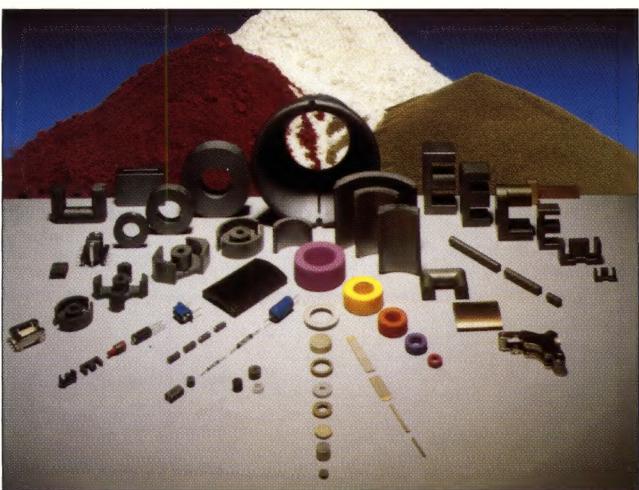
Philips leads the world in sales of the popular 80C51 8-bit microcontrollers and has the largest range of configurations and performance options, including devices operating down to 1.8V. For 16-bit applications we now have a developing range of XA (eXtended Architecture) devices, which provides a smooth upgrade path for 80C51 users.

In communications, our focus is to provide solutions for eight key segments - data communications, RF communication, line telephony, cellular and cordless telephony, portable mobile radio, pagers, satellite and multimedia communications.

In automotive, we offer solutions for systems throughout the vehicle: safety (ABS, airbag and traction control); comfort (climate control, power windows and mirrors and central locking); and engine management (diagnostics, lighting and dashboard control). Plus state-of-the-art vehicle immobilisation systems and multiplex wiring buses.

In audio and video, we have over 200 ICs for TV, video cameras, VCRs and monitors. For TV, our latest developments include Picture Quality Improvement and Picture-in-Picture ICs. As a world leader in audio processing, Philips offer a comprehensive range of DACs, ADCs, power amplifiers and a new DSP which can deliver concert hall and similar effects. For radio systems we offer products for portable and home hi-fi, and car radio systems.

Leadership in smart card ICs and systems is a vision Philips has consistently pursued in the last decade. Following this vision, Philips was the first semiconductor company to introduce a smart card controller with an on-chip crypto system. Today our latest crypto controller can perform RSA public key signature calculation in a blistering 60ms. Not satisfied with advanced high security smart card ICs, Stored Value Cards, banking and telecoms, Philips now have contactless smart card systems for Automatic Fare Collection, access control and stored value.



## Custom Microelectronics

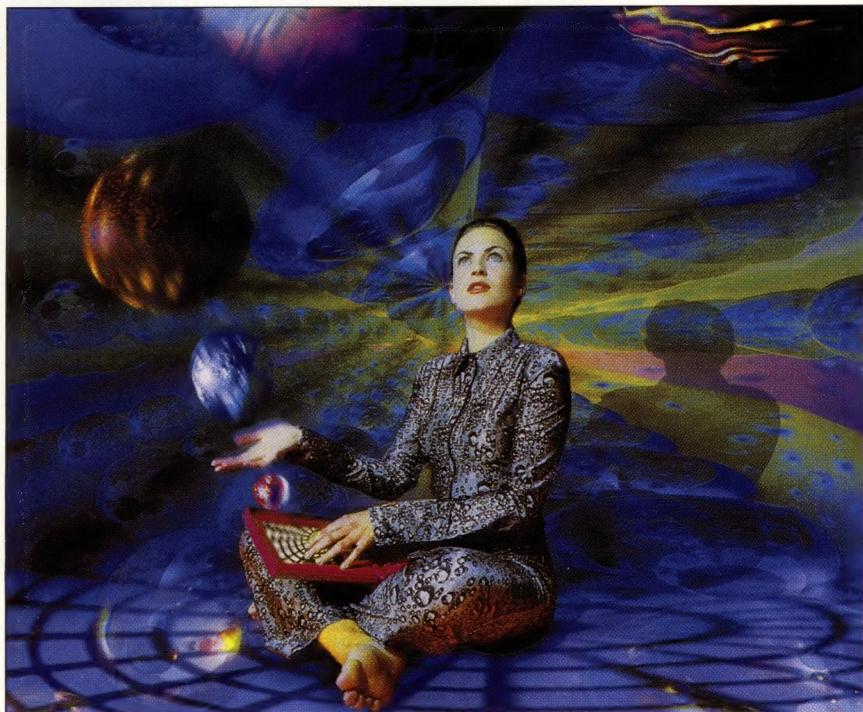
Your partner in the design and production of cost effective modular component solutions.

Philips Custom Microelectronics provides custom solutions that meet the demands of faster development time, fewer resources, limited space and superior performance giving you a competitive advantage.

Using component level technologies, custom ICs, thick film hybrids, surface

mounted assembly or the most appropriate combination, our applications, design and production teams will create the optimum purpose-built solution for your product.

World leaders in semiconductor thermostat technology, proven in Australia's highest volume telecommunications and automotive applications, our team will work closely with you to produce a leading solution for your needs.



## Standard and Discrete Semiconductors

Philips offer a wide range of integrated circuits and discrete semiconductors to supply the consumer market's increasing demand for versatility.

Philips have long been manufacturing quality products such as Bipolar & CMOS logic and linear industrial ICs. In recent years, Philips has offered the widest range of 3V and 5V families. The ALVT is the fastest TTL currently available with typical propagation delays of 1.5ns.

Philips supply a wide range of discrete semiconductors that stretch from small signal diodes and transistors through power rectifiers and triacs to market-leading wideband amplifier modules for CATV systems.

In RF discretes, the high frequency capabilities of silicon have already broken through perceived barriers, beating more exotic semiconductor materials for price and performance.

With TOPFETs, Philips introduced the first fully temperature and overload-protected discrete power MOSFETs.

Philips was a pioneer of surface-mount technology 25 years ago and we are progressively shrinking standard packages to match the needs of today's miniature, portable applications.

## Magnetic Products and Materials

Philips is one of the world's leading manufacturers of soft ferrites and magnets.

We offer a full range of ferrites in various shapes, sizes and materials which suit even the most demanding requirements in applications such as pulse and power transformers, filter inductors, EMI suppression and for general purposes. Our very comprehensive range is further complimented by some specialty ferrites and piezoelectric ceramics. We also supply accessories, bobbins, clips and springs which you may need in order to complete a ferrite set.

## Electromechanical Products

Philips Components also offers a range of selected electromechanical and display products. We offer LCDs and modules (both standard as well as custom made designs), fuses, heatsinks, filters, connectors and other selected products from leading manufacturers.

A wide and innovative range of standard and discrete semiconductors



...with Philips



# Philips Components

## Your partner from concept to delivery

Philips Components, specialists in the supply of complete component solutions which satisfy the challenging demands of high level miniaturisation, automatic assembly and cost saving integration.

Enquiry No. 1350



# PHILIPS

*Let's make things better.*